

ROCK CREEK PARKWAY

FINAL HYDRAULICS REPORT



Prepared for:

**U.S DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATON
EASTERN FEDERAL LANDS HIGHWAY DIVISION**

Prepared by:

**PHOENIX ENGINEERING, INC.
1420-A JOH AVENUE
BALTIMORE, MARYLAND 21227**

January 2006



PHOENIX ENGINEERING, INC.

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Introduction

This report was prepared to document the investigation and recommendations for the existing hydraulic conditions along Rock Creek Parkway. The project limits are from Virginia Ave to P Street Bridge, including the Thompson Boat Center parking lots. The existing inlet conditions were analyzed and they are either modified or new inlets are added. The existing culverts are examined along with the flood history.

Methodologies Utilized

The drainage areas were derived from the digital construction drawing using CADD tools. The rainfall intensity for the inlets was based on the 10 year storm with a Time Of Concentration (Tc) of a minimum of 5 minutes from Maryland Department of Transportation State Highway Administration "Highway Drainage Manual". This report was compiled following Federal Lands Highway, Project Development Design Manual (PDDM) section on Reporting and Documentation. Flood plain parameters acquired from FEMA Maps and maintenance crews from the National Park Service. Inlet analysis was conducted using the FHWA Visual Urban Program (HY-22).

Analysis

The proposed improvements include the resurfacing of Rock Creek Parkway between Virginia Ave and P Street Bridge. The area of the Thompson Boat Center parking lot is being regraded to ensure positive drainage to existing inlets. An existing Spring Box/inlet is located approximately 700 feet north of M Street Bridge, and a spring 100 feet north of the spring box/inlet. An under drain has been added along the west side of Rock Creek Parkway between the Hiker/Biker trail and the curb line.

From Virginia Ave to the P Street Bridge no changes to the roadway alignment were made. The only changes to drainage occur through damaged inlets or lack of efficiency. First, all inlets along the roadway into the Thompson Boat Center will have their grates replaced with Curved Vane Grates to make the inlets bicycle safe. The existing inlet, Ex. I-2, will also have the frame

replaced because the top has been broken off. The inlets in the parking lot will be removed and replaced by type 2 catch basins that will provide water quality for the newly resurfaced parking lot.

The median on Rock Creek Parkway at the Virginia Ave intersection has drainpipes across it to drain the south bound lanes through the median then across the north bound lanes. A new median will be built with an inlet and the pipes removed. The new inlet will receive the runoff from the south bound lanes and convey it to a new inlet that will be built along the fillet of Rock Creek Parkway northbound and Virginia Ave westbound. This additional inlet was added due to ponding in the roadway caused by the extreme flat slopes of both roads.

Next, the four existing inlets under the K Street Bridge are curb opening inlets that should have the tops replaced and their openings restored to original size. See pictures for existing conditions.

All frame and grate inlets along Rock Creek Parkway should have Curved Vane Grates. Any existing inlets that do not have Curved Vane Grates will have their grates removed and Curved Vane Grates will be installed as shown on the construction plans. New inlets that will be installed along Rock Creek Parkway will have Curved Vane Grates. These proposed inlets will be water quality inlets, which are deeper and have a hood and trap to keep debris in the structure that will be cleaned out during routine maintenance.

All existing inlets were analyzed for spacing and efficiency for the 10-year storm. Existing inlets that exceeded the Allowable Spread (AS) of $\frac{1}{2}$ the travel lane width plus the shoulder if applicable (EFLHD PDDM, Chapter 7, Table 7-2) or overtop the mountable curb along the Parkway have been modified to meet the requirements and/or inlets have been added ahead of existing inlets to reduce the drainage areas to meet inlet design parameters.

Many of the existing storm drain culverts are original terra cotta pipes. The culverts appear to be functional but require maintenance to remove a large amount of silting. Rock Creek Parkway has a high ADT and replacing the existing culverts would be costly, time consuming and impose major traffic problems. An effective solution to the problems incurred with replacing these culverts is the use of insertion liners. Lining the existing culverts provides a virtually new pipe culvert that is comparable to replacement without the problems incurred with replacing the culvert. A second advantage is cost savings. It is easy to see that the cost of insertion lining an existing pipe culvert under a high volume road compared to the cost of open cut trenching, with resultant increased construction time, increased manpower, and traffic control problems will yield a savings.

The amount of savings realized is dependent on the depth of fill over the culvert, length of the culvert, volume of traffic on the road over the culvert, and a number of other factors. One possible disadvantage of using insertion lining is that the cross-sectional area of the pipe will be reduced, possibly reducing the hydraulic capacity.

Having reviewed the advantages and disadvantages there are no major disadvantages to lining the existing culverts. Each culvert crossing Rock Creek Parkway will be cleaned of debris along with the inlets and pipe liners will be inserted. This will increase the life of the pipe and reduce the roughness coefficient possibly decreasing the silt build up in the culverts. However the main reason for the sedimentation in the systems is the extreme flat slopes and the outfall being submerged in Rock Creek for a majority of storms. The storm drain system should be maintained frequently to ensure the maximum drainage.

An existing eight-inch Flood Control Curb on the East side of Rock Creek Parkway from the Pennsylvania Avenue to P Street Bridge provides a barrier from runoff depths from Rock Creek Parkway that overtop the mountable curb. Without the Flood Control Curb the runoff could erode the existing slope and eventually undermine the Parkway. The new proposed improvements have incorporated the Flood Curbs' usefulness and will not disturb its location.

On the West side of Rock Creek Parkway there is some standing water. An under drain system will be added approximately 200 feet north and south of an existing spring box (STA. 27+60). This under drain will be located between the Hiker/Biker Trail and the west curb line of Rock Creek parkway. It will drain to the existing spring box then follow the existing drainage system to remove the standing water.

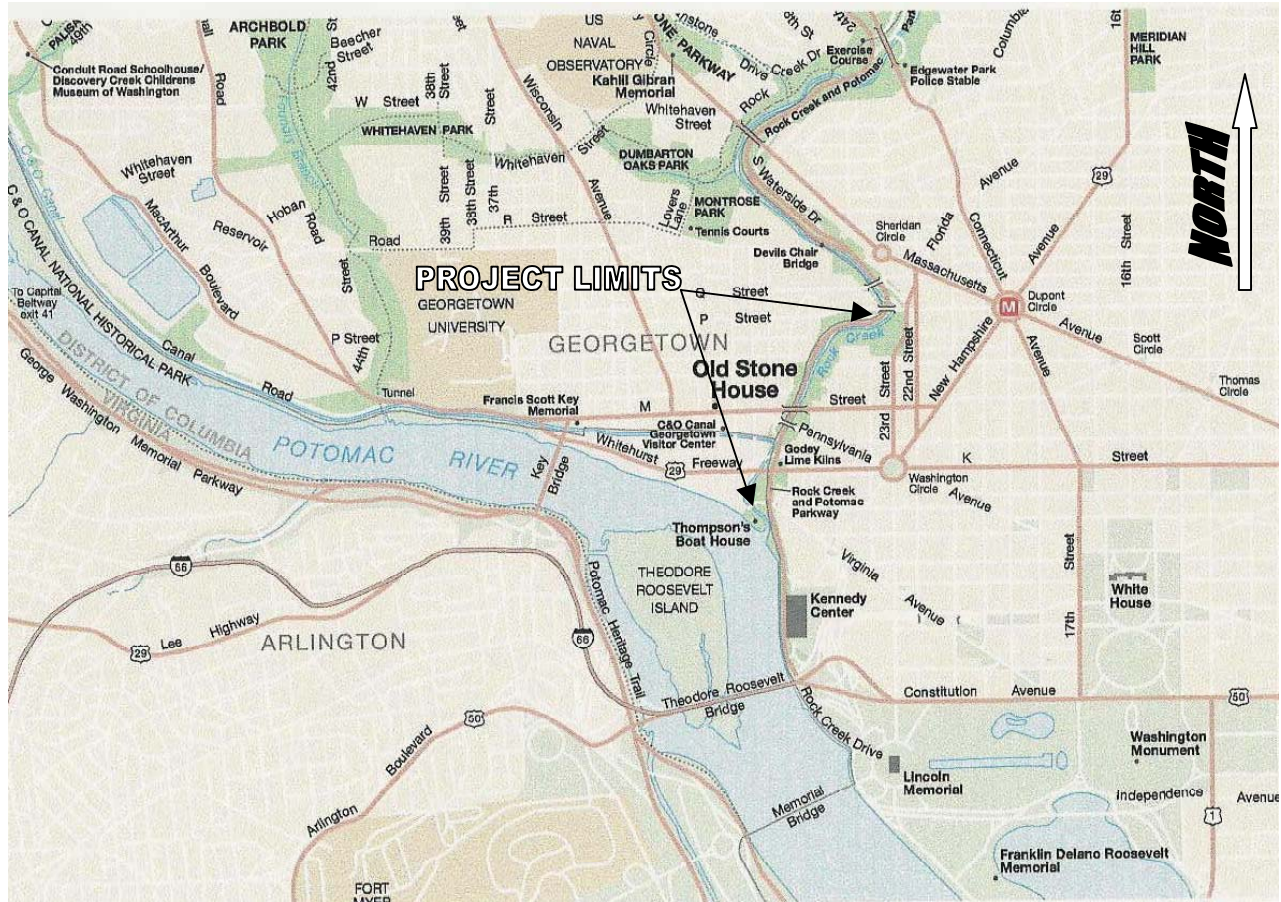
The entire limits of the Parkway fall within the 100 Year Flood Boundary according to the FEMA Flood maps, Panels 110001 0020 B & 110001 0015 B. Manhole covers within the job limits should be bolted down.

Summary

New inlets will be added at the intersection of Virginia Ave and Rock Creek Parkway and inlets will also be added to meet the spread or depth criteria along the Rock Creek Parkway from the Virginia Ave intersection to P Street Bridge. All inlets along the roadway to the Thompson Boat Center will have their grates replaced with Curved Vane Grates. Calculations were done for the inlet spacing and efficiency. Flood analysis was done using FEMA maps and reports.

Conclusion

All investigations, analysis and computations were made in compliance with the requirements of the “Federal Lands Highway Project Development and Design Manual” and the Maryland Department of Transportation State Highway Administration “Highway Drainage Manual”.

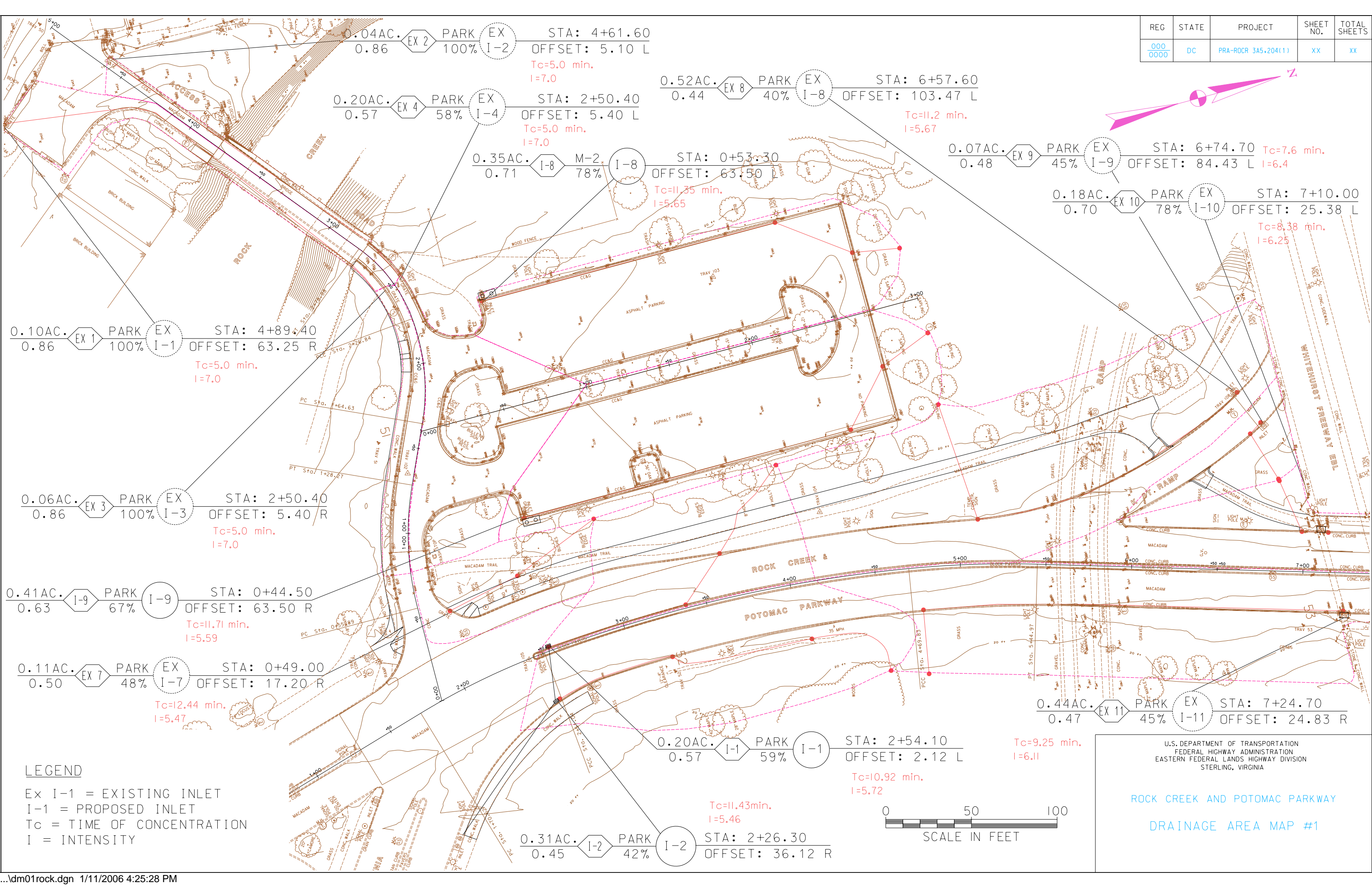


VICINITY MAP

SCALE: 1" = 4000'

APPENDIX “A”
DRAINAGE AREA MAPS

REG	STATE	PROJECT	SHEET NO.	TOTAL SHEETS
000 0000	DC	PRA-ROCR 3A5.204(1)	XX	XX



0.04AC. EX 2 PARK EX STA: 4+61.60
0.86 100% I-2 OFFSET: 5.10 L
Tc=5.0 min.
I=7.0

0.20AC. EX 4 PARK EX STA: 2+50.40
0.57 58% I-4 OFFSET: 5.40 L
Tc=5.0 min.
I=7.0

0.52AC. EX 8 PARK EX STA: 6+57.60
0.44 40% I-8 OFFSET: 103.47 L
Tc=11.2 min.
I=5.67

0.07AC. EX 9 PARK EX STA: 6+74.70 Tc=7.6 min.
0.48 45% I-9 OFFSET: 84.43 L I=6.4

0.18AC. EX 10 PARK EX STA: 7+10.00
0.70 78% I-10 OFFSET: 25.38 L
Tc=8.38 min.
I=6.25

0.10AC. EX 1 PARK EX STA: 4+89.40
0.86 100% I-1 OFFSET: 63.25 R
Tc=5.0 min.
I=7.0

0.06AC. EX 3 PARK EX STA: 2+50.40
0.86 100% I-3 OFFSET: 5.40 R
Tc=5.0 min.
I=7.0

0.41AC. EX 6 PARK EX STA: 0+44.50
0.63 67% I-9 OFFSET: 63.50 R
Tc=11.71 min.
I=5.59

0.11AC. EX 7 PARK EX STA: 0+49.00
0.50 48% I-7 OFFSET: 17.20 R
Tc=12.44 min.
I=5.47

0.20AC. EX 11 PARK EX STA: 2+54.10
0.57 59% I-1 OFFSET: 2.12 L
Tc=9.25 min.
I=6.11

0.44AC. EX 11 PARK EX STA: 7+24.70
0.47 45% I-11 OFFSET: 24.83 R

LEGEND
Ex I-1 = EXISTING INLET
I-1 = PROPOSED INLET
Tc = TIME OF CONCENTRATION
I = INTENSITY

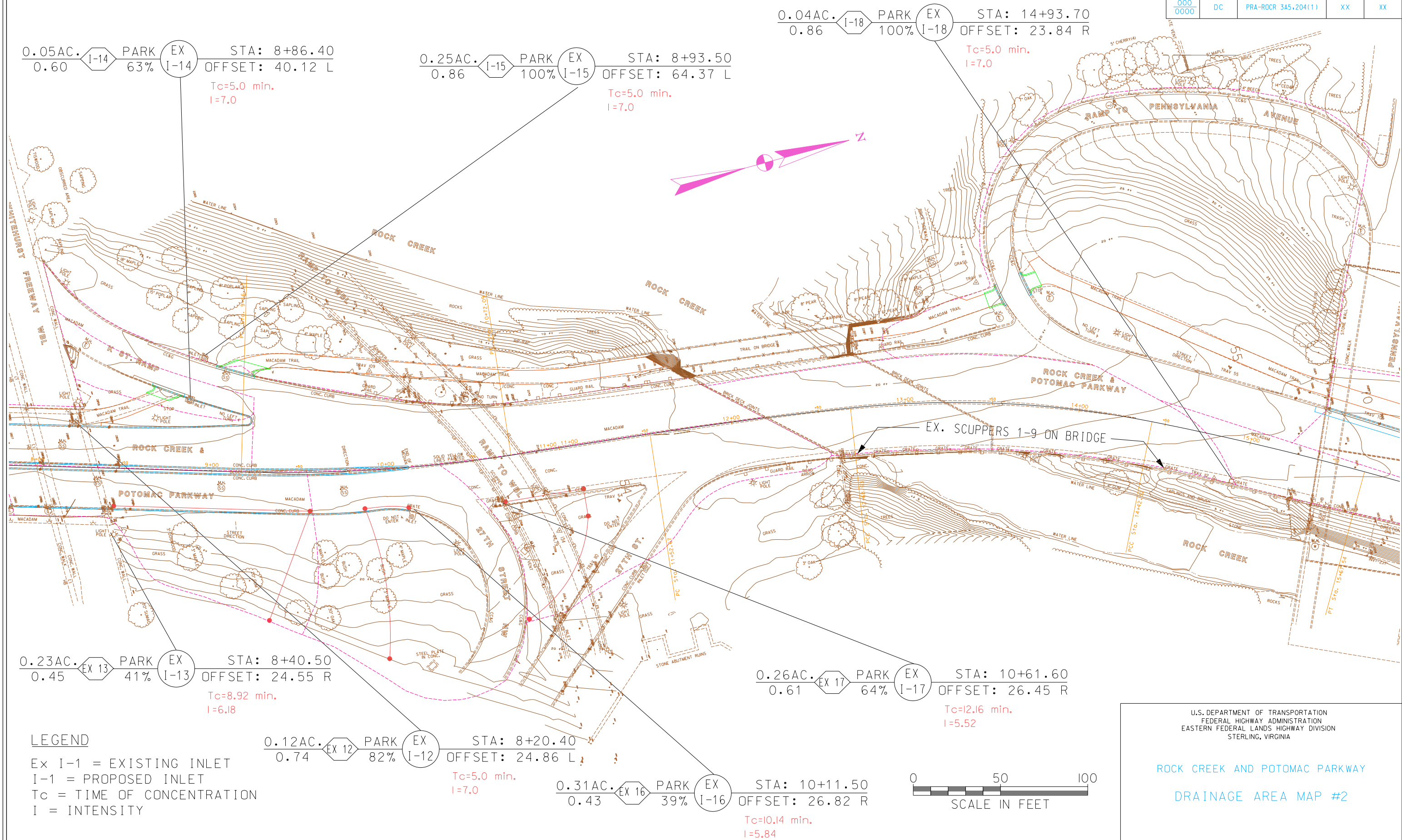
0.31AC. EX 12 PARK EX STA: 2+26.30
0.45 42% I-2 OFFSET: 36.12 R
Tc=11.43min.
I=5.46



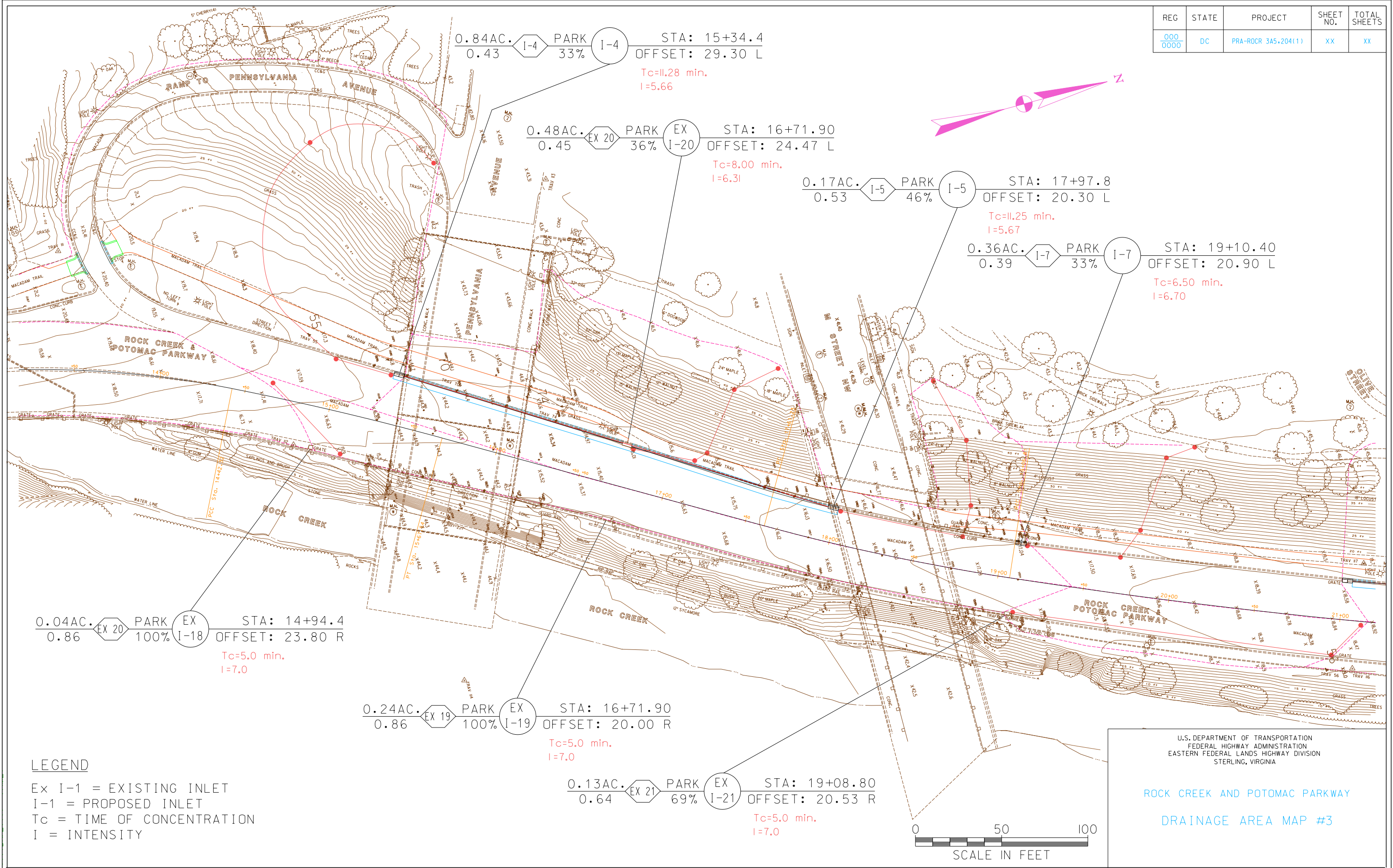
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STERLING, VIRGINIA

ROCK CREEK AND POTOMAC PARKWAY
DRAINAGE AREA MAP #1

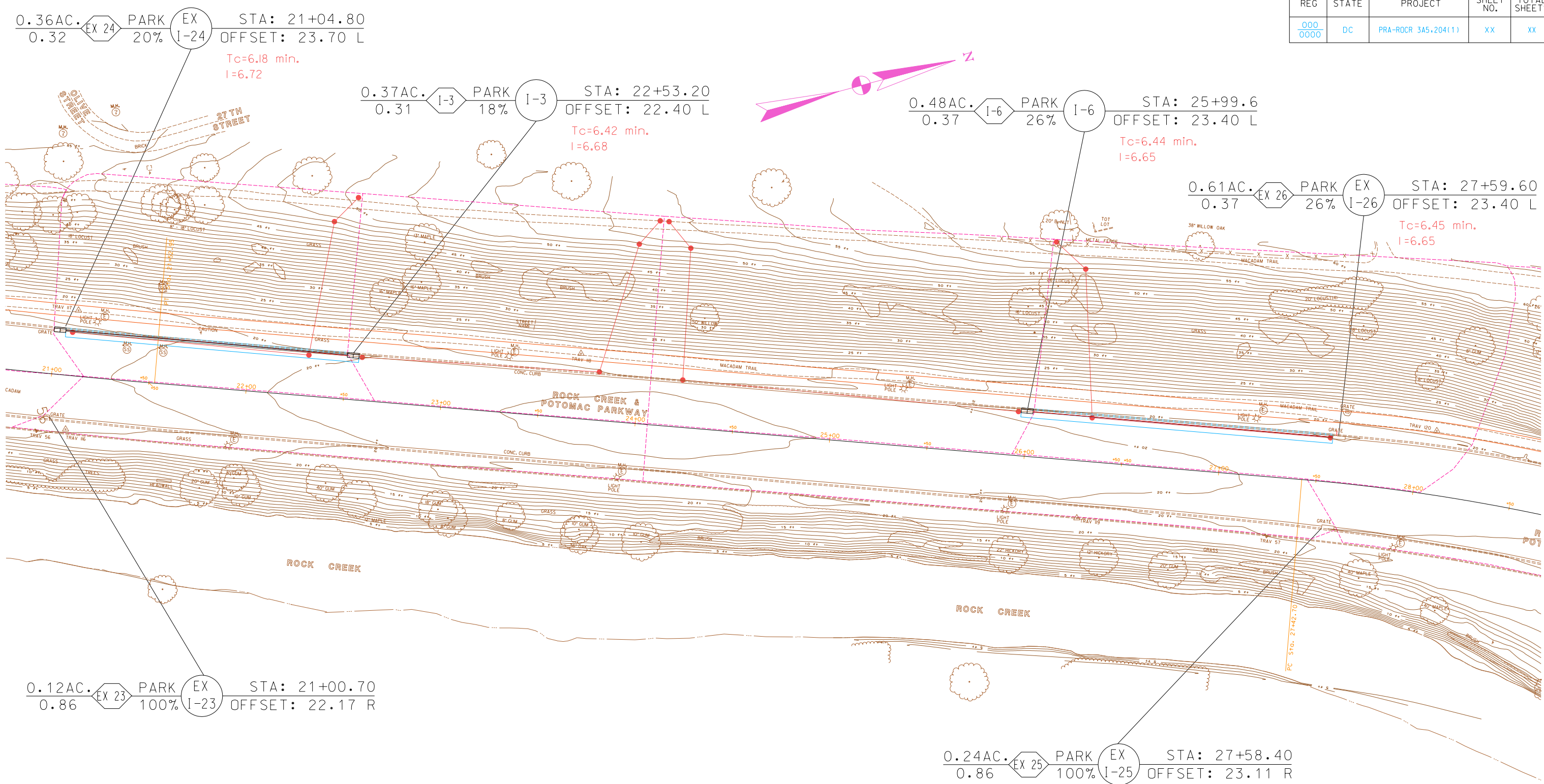
REG	STATE	PROJECT	SHEET NO.	TOTAL SHEETS
000 0000	DC	PRA-ROCR 3A5.204(1)	XX	XX



REG	STATE	PROJECT	SHEET NO.	TOTAL SHEETS
000 0000	DC	PRA-ROCR 3A5.204(11)	XX	XX



REG	STATE	PROJECT	SHEET NO.	TOTAL SHEETS
000 0000	DC	PRA-ROCR 3A5.204(11)	XX	XX



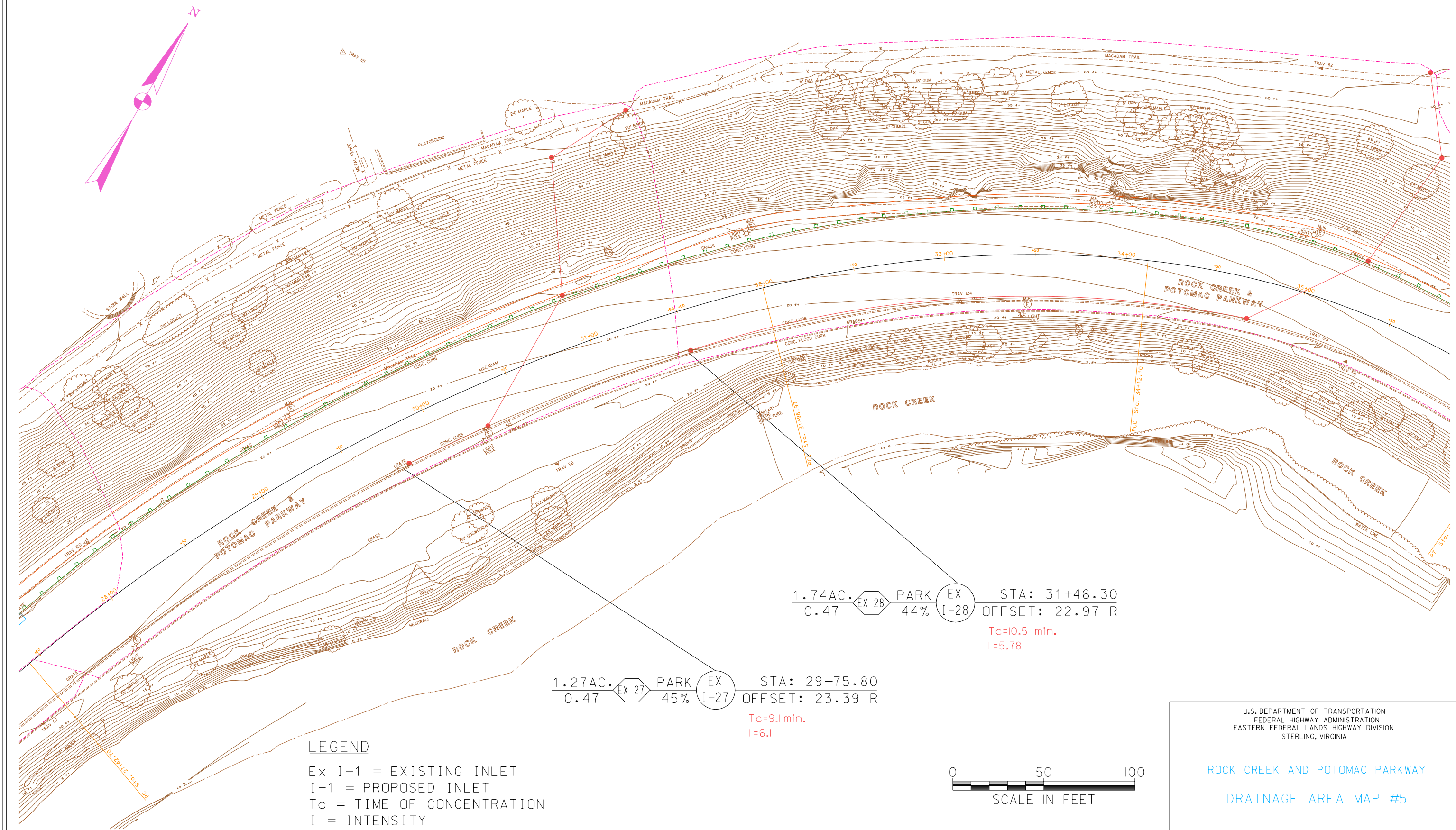
LEGEND
Ex I-1 = EXISTING INLET
I-1 = PROPOSED INLET
Tc = TIME OF CONCENTRATION
I = INTENSITY



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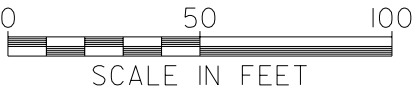
ROCK CREEK AND POTOMAC PARKWAY
DRAINAGE AREA MAP #4

REG	STATE	PROJECT	SHEET NO.	TOTAL SHEETS
000 0000	DC	PRA-ROCR 3A5.204(1)	XX	XX



LEGEND

Ex I-1 = EXISTING INLET
I-1 = PROPOSED INLET
 T_c = TIME OF CONCENTRATION
I = INTENSITY



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ROCK CREEK AND POTOMAC PARKWAY
DRAINAGE AREA MAP #5

REG	STATE	PROJECT	SHEET NO.	TOTAL SHEETS
000 0000	DC	PRA-ROCR 3A5.204(1)	XX	XX

0.16AC. EX 30 PARK EX STA: 2+04.30
0.86 100% I-30 OFFSET: 17.20 L
Tc=5.0 min.
I=7.0

1.16AC. EX 33 PARK EX STA: 0+63.30
0.46 43% I-33 OFFSET: 17.10 R
Tc=9.7 min.
I=5.98

0.14AC. EX 32 PARK EX STA: 40+86.00
0.70 76% I-32 OFFSET: 24.16 L
Tc=5.0 min.
I=7.0

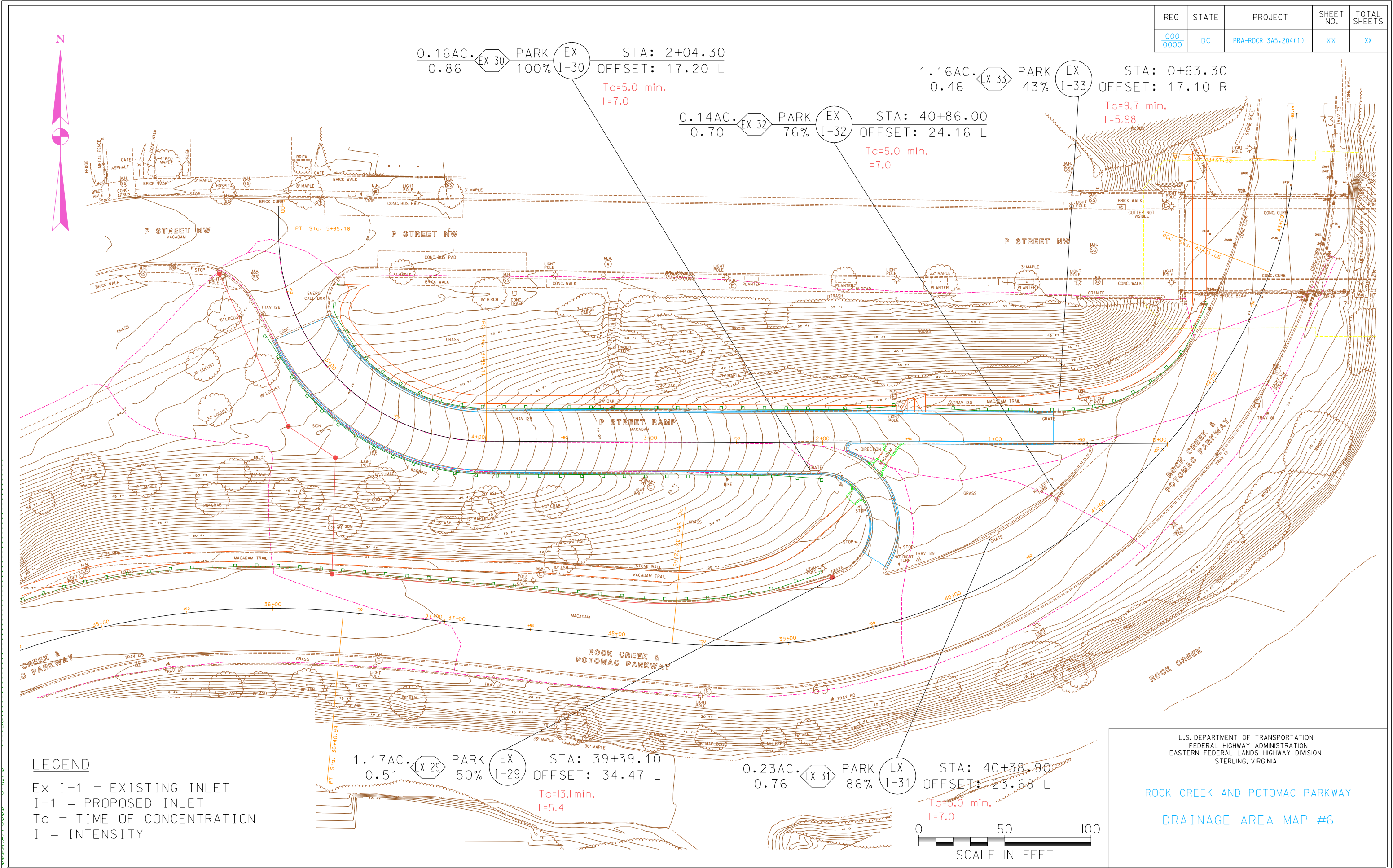
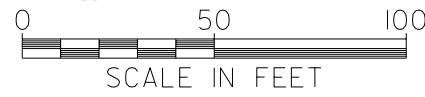
1.17AC. EX 29 PARK EX STA: 39+39.10
0.51 50% I-29 OFFSET: 34.47 L
Tc=13.1min.
I=5.4

0.23AC. EX 31 PARK EX STA: 40+38.90
0.76 86% I-31 OFFSET: 23.68 L
Tc=5.0 min.
I=7.0

LEGEND
Ex I-1 = EXISTING INLET
I-1 = PROPOSED INLET
Tc = TIME OF CONCENTRATION
I = INTENSITY

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ROCK CREEK AND POTOMAC PARKWAY
DRAINAGE AREA MAP #6



APPENDIX “B”

PICTURES



PHOENIX ENGINEERING, INC.

**ROCK CREEK & POTOMAC PARKWAY
VIRGINIA AVE. TO P STREET
PAVEMENT INVESTIGATION**

Figure:

1

Date: 01/2004

Project No: 99-018.01

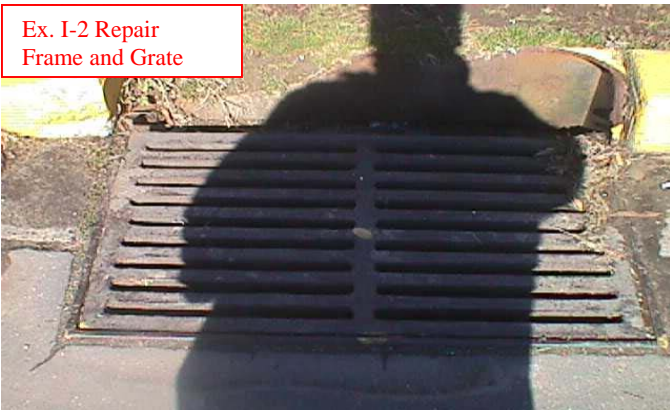
Bridge to Thompson
Boat Center



Ex. I-1 In Thompson
Boat Center Parking Lot



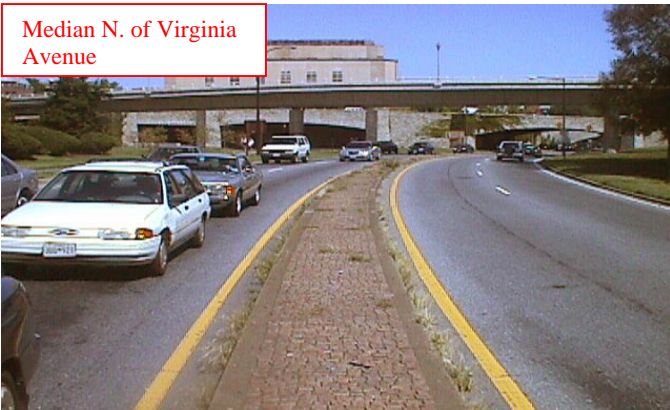
Ex. I-2 Repair
Frame and Grate



Ex. I-3, I-4 Replace Grates
with Curved Vane Grates



Median N. of Virginia
Avenue



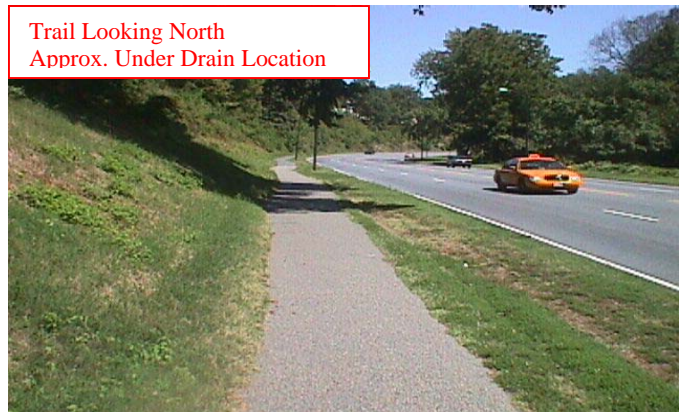
Ex. I-12 Damaged Curb Opening
Inlet under K Street Bridge



Ex. I-10 Damaged Curb Opening
Inlet under K Street Bridge



Trail Looking North
Approx. Under Drain Location





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**ROCK CREEK & POTOMAC PARKWAY
VIRGINIA AVE. TO P STREET
PAVEMENT INVESTIGATION**

Figure:

2

Date: 06/2003

Project No: 99-018.01

Flood Curb along
Parkway



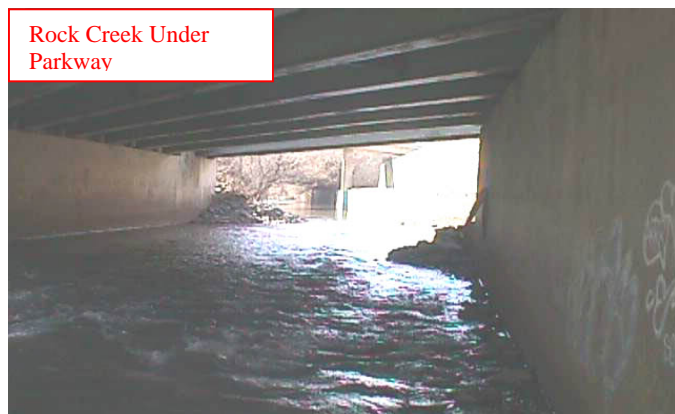
Double Curved
Vane Grates



Ex. I-22



Rock Creek Under
Parkway



Ex. I-30 Double Grate



Ex. I-33 and Trail



Ex. I-19 Standard
Grates



Ex. I-17 and Ex. I-16



APPENDIX “C”

Inlet & Gutter Computations

Figure 4.07

INLET & GUTTER COMPUTATIONS																(SEAL)	
PROJECT NAME: <u>Rock Creek Parkway</u> COMPUTED BY: <u>DRB</u> DATE: <u>02-06-03</u> CHECKED BY: _____ DATE: _____ <div>DESIGN FREQUENCY:10 YR.</div>																	
INLET NO.	AREA AC.	TIME MIN.	C	C x A	I IN./HR.	Q CFS	Q bypass CFS	TOTAL Q TO INLET CFS	STREET GRADE %	INLET TYPE	INLET CAPACITY CFS	SPREAD FT	Allowable SPREAD FT	Q BYPASS CFS	TO INLET NO.	REMARKS	
Ex.I-1	0.10	5.0	0.86	0.09	7.0	0.60	0.07	0.67	4.0	6A	0.67	3.8	N/A	0.00		Sump	
Ex-I-2	0.04	5.0	0.86	0.04	7.0	0.27	0.18	0.45	4.5	6A	0.42	3.06	N/A	0.03	Ex.I-1	replace frame/broken top	
Ex.I-3	0.06	5.0	0.86	0.05	7.0	0.34	0.00	0.34	1.0	6A	0.29	4.7	N/A	0.05	Ex.I-1		
Ex.I-4	0.20	5.0	0.57	0.12	7.0	0.81	0.00	0.81	1.0	6A	0.63	6.37	N/A	0.18	Ex.I-2		
I-8	0.35	11.4	0.71	0.25	5.7	1.40	0.00	1.40	1.0	CB T-2	1.4	10.71	N/A	0.00		cor. Parking Lot (sump)	
I-9	0.41	11.7	0.63	0.26	5.6	1.43	0.00	1.43	1.0	CB T-2	1.43	10.81	N/A	0.00		cor. Parking Lot (sump)	
Ex. I-7	0.11	12.4	0.50	0.05	5.5	0.29	0.00	0.29	1.0	6A	0.29	3.86	6.0'	0.00			
Ex. I-8	0.52	11.2	0.44	0.23	5.7	1.30	0.00	1.30	1.0	5'COG	1.30	5.84	5.5'	0.00			
Ex. I-9	0.07	7.6	0.48	0.03	6.4	0.21	0.00	0.21	1.0	5'COG	0.21	2.8	5.5'	0.00			
Ex. I-10	0.18	8.4	0.70	0.13	6.3	0.80	0.00	0.80	0.0	5'COS	0.8	3.38	5.5'	0.00		repair top & throat	
Ex. I-11	0.44	9.3	0.47	0.21	6.1	1.27	0.00	1.27	0.0	5'COS	1.27	5.75	5.5'	0.00		repair top & throat	
Ex. I-12	0.12	5.0	0.74	0.09	7.0	0.62	0.00	0.62	0.0	5'COS	0.62	2.85	5.5'	0.00		repair top & throat	
Ex. I-13	0.23	8.9	0.45	0.10	6.2	0.65	0.00	0.65	0.0	5'COS	0.65	3.68	5.5'	0.00		repair top & throat	
Ex. I-14	0.05	5.0	0.60	0.03	7.0	0.23	0.00	0.23	1.5	5'COG	0.23	1.38	5.5'	0.00			
Ex. I-15	0.25	5.0	0.86	0.22	7.0	1.53	0.00	1.53	1.0	5'COG	1.53	4.88	5.5'	0.00			
Ex. I-16	0.31	10.1	0.43	0.13	5.8	0.79	0.00	0.79	1.0	6A	0.79	4.52	5.5'	0.00			
Ex. I-17	0.26	12.2	0.61	0.16	5.5	0.88	0.00	0.88	1.0	6A	0.88	4.86	10.0'	0.00			
Ex. I-18	0.04	5.0	0.86	0.04	7.0	0.26	0.16	0.42	1.0	5A	0.4	5.08	6.5'	0.02	Ex. I-19	at bridge w/ scuppers	
Ex. I-19	0.24	5.0	0.86	0.20	7.0	1.43	0.10	1.53	1.0	double 6A	1.53	6.03	6.5'	0.00		sump	
I-4	0.84	11.3	0.43	0.36	5.7	2.02	0.00	2.02	2.5	double 6A	1.813	5.24	6.5'	0.21	Ex. I-20		
Ex. I-20	0.48	7.2	0.45	0.22	6.4	1.38	0.26	1.65	1.0	double 6A	1.65	5.9	6.5'	0.00		sump	
Ex. I-21	0.13	5.0	0.64	0.09	7.0	0.60	0.09	0.69	1.0	6A	0.61	5.68	6.5'	0.08	Ex. I-19		
I-5	0.17	11.3	0.53	0.09	5.7	0.50	0.07	0.57	1.0	double 6A	0.52	5.22	6.5'	0.05	Ex. I-20		
I-7	0.37	6.5	0.38	0.14	6.7	0.95	0.00	0.95	1.0	double 6A	0.88	6.5	6.5'	0.07	I-5	replaced and moved	
Ex. I-23	0.12	5.0	0.86	0.10	7.0	0.73	0.00	0.73	1.0	6A	0.64	5.82	6.5'	0.09	Ex. I-21		
Ex. I-24	0.36	6.2	0.32	0.11	6.7	0.77	0.05	0.82	1.0	double 6A	0.82	6.12	6.5'	0.00	Ex. I-22	removed & replaced	
I-3	0.37	6.4	0.31	0.12	6.7	0.78	0.00	0.78	1.0	double 6A	0.733	5.99	6.5'	0.05	Ex. I-24		
Ex. I-25	0.24	5.0	0.86	0.20	7.0	1.43	0.00	1.43	0.7	double 6A	1.33	6.46	6.5'	0.10	Ex. I-27		
I-6	0.48	6.4	0.37	0.18	6.7	1.17	0.00	1.17	1.0	double 6A	1.13	6.32	6.5'	0.04	Ex. I-26		
Ex. I-26	0.61	6.5	0.37	0.23	6.6	1.49	0.04	1.53	1.0	double 6A	1.53	6.48	6.5'	0.00		Sump	
Ex. I-27	1.27	9.1	0.47	0.60	6.1	3.69	0.64	4.34	1.0	double 6A	4.34	5.03	7.0'	0.00		Sump	
Ex. I-28	1.74	10.5	0.47	0.82	5.8	4.73	0.00	4.73	1.0	double 6A	4.176	6.3	7.0'	0.55	Ex. I-27		
Ex. I-29	1.17	13.1	0.51	0.59	5.4	3.18	0.04	3.22	1.0	double 6A	3.22	7.37	8.0'	0.00		Sump	
Ex. I-30	0.16	5.0	0.86	0.13	7.0	0.94	0.00	0.94	10.0	double 6A	0.9	3.85	8.0'	0.04	Ex. I-29	changed to Curved Vane	
Ex. I-31	0.23	5.0	0.76	0.18	7.0	1.25	0.00	1.25	1.0	double 6A	1.25	6.14	7.0'	0.00		Sump	
Ex. I-32	0.14	5.0	0.70	0.10	7.0	0.67	0.00	0.67	1.0	double 6A	0.67	4.05	7.0'	0.00		Sump	
Ex. I-33	1.16	9.7	0.46	0.53	6.0	3.18	0.00	3.18	1.0	double 6A	3.18	7.3	8.0'	0.00		Sump	

Figure 4.07

I-1	0.20	10.9	0.57	0.11	5.7	0.65	0.00	0.65	1.0	6A	0.57	5.53	6.0'	0.08	I-2	proposed 6A
I-2	0.31	11.4	0.45	0.14	5.6	0.78	0.08	0.87	1.0	6A	0.73	6.28	8.0'	0.14	Ex. I-35	proposed 6A
Ex. SC-1	0.03	5.0	0.86	0.03	7.0	0.19	0.00	0.19	1.0		0.12	2.93	8.0'	0.07	SC-2	Scupper on Bridge
Ex. SC-2	0.03	5.0	0.86	0.03	7.0	0.18	0.07	0.25	1.0		0.15	3.25	8.0'	0.10	SC-3	Scupper on Bridge
Ex. SC-3	0.03	5.0	0.86	0.02	7.0	0.16	0.10	0.25	1.0		0.15	3.25	8.0'	0.10	SC-4	Scupper on Bridge
Ex. SC-4	0.03	5.0	0.86	0.02	7.0	0.15	0.10	0.26	1.0		0.15	3.30	8.0'	0.10	SC-5	Scupper on Bridge
Ex. SC-5	0.02	5.0	0.86	0.02	7.0	0.14	0.10	0.25	1.0		0.15	3.25	8.0'	0.10	SC-6	Scupper on Bridge
Ex. SC-6	0.02	5.0	0.86	0.02	7.0	0.13	0.10	0.22	1.0		0.13	3.10	8.0'	0.09	SC-7	Scupper on Bridge
Ex. SC-7	0.02	5.0	0.86	0.01	7.0	0.10	0.09	0.19	1.0		0.12	2.93	8.0'	0.07	SC-8	Scupper on Bridge
Ex. SC-8	0.04	5.0	0.86	0.03	7.0	0.23	0.07	0.31	1.0		0.17	3.52	8.0'	0.14	SC-9	Scupper on Bridge
Ex. SC-9	0.03	5.0	0.86	0.03	7.0	0.21	0.14	0.35	1.0		0.19	3.68	8.0'	0.16	Ex. I-18	Scupper on Bridge

APPENDIX “D”
“C” Factor Computations

"C" FACTOR COMPUTATIONS

JOB NAME: Rock Creek Parkway

DPZ NO.:

DATE: 6/10/2004

Area #	Ex.I-1	Total Area	4313.00				
	l.f. pavement	= 4313.000	s.f.	= 100 % @	0.86	=	0.86
	building/roof	=	s.f.	= 0 % @		=	0
	l.f. driveways	=	s.f.	= 0 % @		=	0
	l.f. sidewalks	=	s.f.	= 0 % @		=	0
		=	s.f.	= 0 % @		=	0
Soil Type	B						
	s.f. lawn			= 0 % @	0.16	=	0
	s.f. woods			= 0 % @		=	0
	s.f. sparse veg.			= 0 % @		=	0
	s.f.bare soil			= 0 % @		=	0
				= 0 % @		=	0
				COMPOSITE "C"		=	0.86
Area #	Ex.I-2	Total Area	1934.00				
	l.f. pavement	= 1934	s.f.	= 100 % @	0.86	=	0.86
	building/roof	=	s.f.	= 0 % @		=	0
	l.f. driveways	=	s.f.	= 0 % @		=	0
	l.f. sidewalks	=	s.f.	= 0 % @		=	0
		=	s.f.	= 0 % @		=	0
Soil Type	B						
	s.f. lawn			= 0 % @	0.16	=	0
	s.f. woods			= 0 % @		=	0
	s.f. sparse veg.			= 0 % @		=	0
	s.f.bare soil			= 0 % @		=	0
				= 0 % @		=	0
				COMPOSITE "C"		=	0.86
Area #	Ex.I-3	Total Area	2432.00				
	l.f. pavement	= 2432	s.f.	= 100 % @	0.86	=	0.86
	building/roof	=	s.f.	= 0 % @		=	0
	l.f. driveways	=	s.f.	= 0 % @		=	0
	l.f. sidewalks	=	s.f.	= 0 % @	0.86	=	0
		=	s.f.	= 0 % @		=	0
Soil Type	B						
	s.f. lawn			= 0 % @	0.16	=	0
	s.f. woods			= 0 % @		=	0
	s.f. sparse veg.			= 0 % @		=	0
	s.f.bare soil			= 0 % @		=	0
				= 0 % @		=	0
				COMPOSITE "C"		=	0.86

"C" FACTOR COMPUTATIONS

JOB NAME: Rock Creek Parkway

DPZ NO.:

DATE: 6/10/2004

Area #	Ex.I-4	Total Area	8891.00			
	I.f. pavement	= 5153 s.f.	= 57.95749 % @	0.86	=	0.498434
	building/roof	= s.f.	= 0 % @		=	0
	I.f. driveways	= s.f.	= 0 % @		=	0
	I.f. sidewalks	= s.f.	= 0 % @	0.86	=	0
		= s.f.	= 0 % @		=	0
Soil Type	B					
3738	s.f. lawn		= 42.04251 % @	0.16	=	0.067268
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f.bare soil		= 0 % @		=	0
			= 0 % @		=	0
			COMPOSITE "C"		=	0.565702
Area #	I-8	Total Area	15203.00			
	I.f. pavement	= 11918 s.f.	= 78.39242 % @	0.86	=	0.674175
	building/roof	= s.f.	= 0 % @		=	0
	I.f. driveways	= s.f.	= 0 % @		=	0
	I.f. sidewalks	= s.f.	= 0 % @	0.86	=	0
		= s.f.	= 0 % @		=	0
Soil Type	B,C					
3285	s.f. lawn		= 21.60758 % @	0.16	=	0.034572
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f.bare soil		= 0 % @		=	0
			= 0 % @		=	0
			COMPOSITE "C"		=	0.708747
Area #	I-9	Total Area	17666.00			
	I.f. pavement	= 11935 s.f.	= 67.55915 % @	0.86	=	0.581009
	building/roof	= s.f.	= 0 % @		=	0
	I.f. driveways	= s.f.	= 0 % @		=	0
	I.f. sidewalks	= s.f.	= 0 % @		=	0
		= s.f.	= 0 % @		=	0
Soil Type	B					
5731	s.f. lawn		= 32.44085 % @	0.16	=	0.051905
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f.bare soil		= 0 % @		=	0
	s.f. lawn		= 0 % @	0.19	=	0
			COMPOSITE "C"		=	0.632914

"C" FACTOR COMPUTATIONS

JOB NAME: Rock Creek Parkway

DPZ NO.:

DATE: 6/10/2004

Area #	Ex. I-7	Total Area	4690.00				
	I.f. pavement	= 2262 s.f.	= 48.23028 % @	0.86	=	0.41478	
	building/roof	= s.f.	= 0 % @		=	0	
	I.f. driveways	= s.f.	= 0 % @	0.86	=	0	
	I.f. sidewalks	= s.f.	= 0 % @		=	0	
		= s.f.	= 0 % @		=	0	
Soil Type	B						
2428	s.f. lawn		= 51.76972 % @	0.16	=	0.082832	
	s.f. woods		= 0 % @		=	0	
	s.f. sparse veg.		= 0 % @		=	0	
	s.f. bare soil		= 0 % @		=	0	
	s.f. lawn		= 0 % @	0.19	=	0	
			COMPOSITE "C"		=	0.497612	
Area #	Ex. I-8	Total Area	22838.00				
	I.f. pavement	= 9029 s.f.	= 39.53499 % @	0.86	=	0.340001	
	building/roof	= s.f.	= 0 % @		=	0	
	I.f. driveways	= s.f.	= 0 % @		=	0	
	I.f. sidewalks	= s.f.	= 0 % @		=	0	
		= s.f.	= 0 % @		=	0	
Soil Type	B						
13809	s.f. lawn		= 60.46501 % @	0.16	=	0.096744	
	s.f. woods		= 0 % @		=	0	
	s.f. sparse veg.		= 0 % @		=	0	
	s.f. bare soil		= 0 % @		=	0	
			= 0 % @		=	0	
			COMPOSITE "C"		=	0.436745	
Area #	Ex. I-9	Total Area	3032.00				
	I.f. pavement	= 1369 s.f.	= 45.15172 % @	0.86	=	0.388305	
	building/roof	= s.f.	= 0 % @		=	0	
	I.f. driveways	= s.f.	= 0 % @		=	0	
	I.f. sidewalks	= s.f.	= 0 % @		=	0	
		= s.f.	= 0 % @		=	0	
Soil Type	B						
1663	s.f. lawn		= 54.84828 % @	0.16	=	0.087757	
	s.f. woods		= 0 % @		=	0	
	s.f. sparse veg.		= 0 % @		=	0	
	s.f. bare soil		= 0 % @		=	0	
			= 0 % @		=	0	
			COMPOSITE "C"		=	0.476062	

"C" FACTOR COMPUTATIONS

JOB NAME: Rock Creek Parkway

DPZ NO.:

DATE: 6/10/2004

Area #	Ex. I-10	Total Area	7889.00				
	l.f. pavement	=	6123 s.f.	=	77.6144 % @	0.86	= 0.667484
	building/roof	=	s.f.	=	0 % @		= 0
	l.f. driveways	=	s.f.	=	0 % @		= 0
	l.f. sidewalks	=	s.f.	=	0 % @	0.86	= 0
		=	s.f.	=	0 % @		= 0
Soil Type	B						
1766	s.f. lawn			=	22.3856 % @	0.16	= 0.035817
	s.f. woods			=	0 % @		= 0
	s.f. sparse veg.			=	0 % @		= 0
	s.f. bare soil			=	0 % @		= 0
	s.f. lawn			=	0 % @	0.19	= 0
					COMPOSITE "C"		= 0.703301
Area #	Ex. I-11	Total Area	19151.00				
	l.f. pavement	=	8597 s.f.	=	44.89061 % @	0.86	= 0.386059
	building/roof	=	s.f.	=	0 % @		= 0
	l.f. driveways	=	s.f.	=	0 % @		= 0
	l.f. sidewalks	=	s.f.	=	0 % @		= 0
		=	s.f.	=	0 % @		= 0
Soil Type	C						
10554	s.f. lawn			=	55.10939 % @	0.16	= 0.088175
	s.f. woods			=	0 % @		= 0
	s.f. sparse veg.			=	0 % @		= 0
	s.f. bare soil			=	0 % @		= 0
				=	0 % @		= 0
					COMPOSITE "C"		= 0.474234
Area #	Ex. I-12	Total Area	5225.00				
	l.f. pavement	=	4309 s.f.	=	82.4689 % @	0.86	= 0.709233
	building/roof	=	s.f.	=	0 % @		= 0
	l.f. driveways	=	s.f.	=	0 % @		= 0
	l.f. sidewalks	=	s.f.	=	0 % @		= 0
		=	s.f.	=	0 % @		= 0
Soil Type	C						
916	s.f. lawn			=	17.5311 % @	0.16	= 0.02805
	s.f. woods			=	0 % @		= 0
	s.f. sparse veg.			=	0 % @		= 0
	s.f. bare soil			=	0 % @		= 0
				=	0 % @		= 0
					COMPOSITE "C"		= 0.737282

"C" FACTOR COMPUTATIONS

JOB NAME: Rock Creek Parkway

DPZ NO.:

DATE: 6/10/2004

Area #	Ex. I-13	Total Area	10078.00			
	l.f. pavement	= 4194 s.f.	= 41.6154 % @	0.86	=	0.357892
	building/roof	= s.f.	= 0 % @		=	0
	l.f. driveways	= s.f.	= 0 % @		=	0
	l.f. sidewalks	= s.f.	= 0 % @	0.86	=	0
		= s.f.	= 0 % @		=	0
Soil Type	B					
5884	s.f. lawn		= 58.3846 % @	0.16	=	0.093415
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f. bare soil		= 0 % @		=	0
	s.f. lawn		= 0 % @	0.19	=	0
			COMPOSITE "C"		=	0.451308
Area #	Ex. I-14	Total Area	2384.00			
	l.f. pavement	= 1494 s.f.	= 62.66779 % @	0.86	=	0.538943
	building/roof	= s.f.	= 0 % @		=	0
	l.f. driveways	= s.f.	= 0 % @		=	0
	l.f. sidewalks	= s.f.	= 0 % @		=	0
		= s.f.	= 0 % @		=	0
Soil Type	C					
890	s.f. lawn		= 37.33221 % @	0.16	=	0.059732
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f. bare soil		= 0 % @		=	0
			= 0 % @		=	0
			COMPOSITE "C"		=	0.598674
Area #	Ex. I-15	Total Area	11091.00			
	l.f. pavement	= 11091 s.f.	= 100 % @	0.86	=	0.86
	building/roof	= s.f.	= 0 % @		=	0
	l.f. driveways	= s.f.	= 0 % @		=	0
	l.f. sidewalks	= s.f.	= 0 % @		=	0
		= s.f.	= 0 % @		=	0
Soil Type	C					
	s.f. lawn		= 0 % @	0.16	=	0
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f. bare soil		= 0 % @		=	0
			= 0 % @		=	0
			COMPOSITE "C"		=	0.86

"C" FACTOR COMPUTATIONS

JOB NAME: Rock Creek Parkway

DPZ NO.:

DATE: 6/10/2004

Area #	Ex. I-16	Total Area	13530.00			
	l.f. pavement	= 5283 s.f.	= 39.04656 % @	0.86	=	0.3358
	building/roof	= s.f.	= 0 % @		=	0
	l.f. driveways	= s.f.	= 0 % @		=	0
	l.f. sidewalks	= s.f.	= 0 % @	0.86	=	0
		= s.f.	= 0 % @		=	0
Soil Type	B					
8247	s.f. lawn		= 60.95344 % @	0.16	=	0.097525
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f. bare soil		= 0 % @		=	0
	s.f. lawn		= 0 % @	0.19	=	0
			COMPOSITE "C"		=	0.433326
Area #	Ex. I-17	Total Area	11379.00			
	l.f. pavement	= 7302 s.f.	= 64.17084 % @	0.86	=	0.551869
	building/roof	= s.f.	= 0 % @		=	0
	l.f. driveways	= s.f.	= 0 % @		=	0
	l.f. sidewalks	= s.f.	= 0 % @		=	0
		= s.f.	= 0 % @		=	0
Soil Type	C					
4077	s.f. lawn		= 35.82916 % @	0.16	=	0.057327
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f. bare soil		= 0 % @		=	0
			= 0 % @		=	0
			COMPOSITE "C"		=	0.609196
Area #	I-1	Total Area	8698.50			
	l.f. pavement	= 5099.1 s.f.	= 58.62045 % @	0.86	=	0.504136
	building/roof	= s.f.	= 0 % @		=	0
	l.f. driveways	= s.f.	= 0 % @		=	0
	l.f. sidewalks	= s.f.	= 0 % @		=	0
		= s.f.	= 0 % @		=	0
Soil Type	C					
3599.4	s.f. lawn		= 41.37955 % @	0.16	=	0.066207
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f. bare soil		= 0 % @		=	0
			= 0 % @		=	0
			COMPOSITE "C"		=	0.570343

"C" FACTOR COMPUTATIONS

JOB NAME: Rock Creek Parkway

DPZ NO.:

DATE: 6/10/2004

Area #	<u>I-2</u>	Total Area	<u>13431.90</u>		
	l.f. pavement	= 5579.26 s.f.	= 41.53738 % @	0.86	= 0.357222
	building/roof	= s.f.	= 0 % @		= 0
	l.f. driveways	= s.f.	= 0 % @		= 0
	l.f. sidewalks	= s.f.	= 0 % @	0.86	= 0
		= s.f.	= 0 % @		= 0
Soil Type	<u>C</u>				
7852.64	s.f. lawn		= 58.46262 % @	0.16	= 0.09354
	s.f. woods		= 0 % @		= 0
	s.f. sparse veg.		= 0 % @		= 0
	s.f. bare soil		= 0 % @		= 0
	s.f. lawn		= 0 % @	0.19	= 0
			COMPOSITE "C"		= 0.450762
Area #	<u>Ex. I-18</u>	Total Area	<u>1900.00</u>		
	l.f. pavement	= 1900 s.f.	= 100 % @	0.86	= 0.86
	building/roof	= s.f.	= 0 % @		= 0
	l.f. driveways	= s.f.	= 0 % @		= 0
	l.f. sidewalks	= s.f.	= 0 % @		= 0
		= s.f.	= 0 % @		= 0
Soil Type	<u>C</u>				
	s.f. lawn		= 0 % @	0.16	= 0
	s.f. woods		= 0 % @		= 0
	s.f. sparse veg.		= 0 % @		= 0
	s.f. bare soil		= 0 % @		= 0
			= 0 % @		= 0
			COMPOSITE "C"		= 0.86
Area #	<u>Ex. I-19</u>	Total Area	<u>10330.00</u>		
	l.f. pavement	= 10330 s.f.	= 100 % @	0.86	= 0.86
	building/roof	= s.f.	= 0 % @		= 0
	l.f. driveways	= s.f.	= 0 % @		= 0
	l.f. sidewalks	= s.f.	= 0 % @		= 0
		= s.f.	= 0 % @		= 0
Soil Type	<u>C</u>				
	s.f. lawn		= 0 % @	0.16	= 0
	s.f. woods		= 0 % @		= 0
	s.f. sparse veg.		= 0 % @		= 0
	s.f. bare soil		= 0 % @		= 0
			= 0 % @		= 0
			COMPOSITE "C"		= 0.86

"C" FACTOR COMPUTATIONS

JOB NAME: Rock Creek Parkway

DPZ NO.:

DATE: 6/10/2004

Area #	Ex. I-20	Total Area	20812.42			
	I.f. pavement	= 8704.76 s.f.	= 41.82483 % @	0.86	=	0.359694
	building/roof	= s.f.	= 0 % @		=	0
	I.f. driveways	= s.f.	= 0 % @		=	0
	I.f. sidewalks	= s.f.	= 0 % @	0.86	=	0
		= s.f.	= 0 % @		=	0
Soil Type	C					
12107.66	s.f. lawn		= 58.17517 % @	0.16	=	0.09308
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f.bare soil		= 0 % @		=	0
	s.f. lawn		= 0 % @	0.19	=	0
			COMPOSITE "C"		=	0.452774
Area #	Ex. I-21	Total Area	5819.00			
	I.f. pavement	= 4030 s.f.	= 69.25589 % @	0.86	=	0.595601
	building/roof	= s.f.	= 0 % @		=	0
	I.f. driveways	= s.f.	= 0 % @		=	0
	I.f. sidewalks	= s.f.	= 0 % @		=	0
		= s.f.	= 0 % @		=	0
Soil Type	C					
1789	s.f. lawn		= 30.74411 % @	0.16	=	0.049191
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f.bare soil		= 0 % @		=	0
			= 0 % @		=	0
			COMPOSITE "C"		=	0.644791
Area #	I-7	Total Area	16235.00			
	I.f. pavement	= 5198 s.f.	= 32.01725 % @	0.86	=	0.275348
	building/roof	= s.f.	= 0 % @		=	0
	I.f. driveways	= s.f.	= 0 % @		=	0
	I.f. sidewalks	= s.f.	= 0 % @		=	0
		= s.f.	= 0 % @		=	0
Soil Type	C					
11037	s.f. lawn		= 67.98275 % @	0.16	=	0.108772
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f.bare soil		= 0 % @		=	0
			= 0 % @		=	0
			COMPOSITE "C"		=	0.384121

"C" FACTOR COMPUTATIONS

JOB NAME: Rock Creek Parkway

DPZ NO.:

DATE: 6/10/2004

Area #	Ex. I-23	Total Area	5259.00			
	l.f. pavement	=	5259 s.f.	=	100 % @	0.86 = 0.86
	building/roof	=	s.f.	=	0 % @	= 0
	l.f. driveways	=	s.f.	=	0 % @	= 0
	l.f. sidewalks	=	s.f.	=	0 % @	0.86 = 0
		=	s.f.	=	0 % @	= 0
Soil Type	C					
	s.f. lawn			=	0 % @	0.16 = 0
	s.f. woods			=	0 % @	= 0
	s.f. sparse veg.			=	0 % @	= 0
	s.f. bare soil			=	0 % @	= 0
	s.f. lawn			=	0 % @	0.19 = 0
					COMPOSITE "C"	= 0.86
Area #	Ex. I-24	Total Area	15810.11			
	l.f. pavement	=	3518 s.f.	=	22.25158 % @	0.86 = 0.191364
	building/roof	=	s.f.	=	0 % @	= 0
	l.f. driveways	=	s.f.	=	0 % @	= 0
	l.f. sidewalks	=	s.f.	=	0 % @	= 0
		=	s.f.	=	0 % @	= 0
Soil Type	C					
12292.11	s.f. lawn			=	77.74842 % @	0.16 = 0.124397
	s.f. woods			=	0 % @	= 0
	s.f. sparse veg.			=	0 % @	= 0
	s.f. bare soil			=	0 % @	= 0
				=	0 % @	= 0
					COMPOSITE "C"	= 0.315761
Area #	Ex. I-25	Total Area	10312.00			
	l.f. pavement	=	10312 s.f.	=	100 % @	0.86 = 0.86
	building/roof	=	s.f.	=	0 % @	= 0
	l.f. driveways	=	s.f.	=	0 % @	= 0
	l.f. sidewalks	=	s.f.	=	0 % @	= 0
		=	s.f.	=	0 % @	= 0
Soil Type	C					
	s.f. lawn			=	0 % @	0.16 = 0
	s.f. woods			=	0 % @	= 0
	s.f. sparse veg.			=	0 % @	= 0
	s.f. bare soil			=	0 % @	= 0
				=	0 % @	= 0
					COMPOSITE "C"	= 0.86

"C" FACTOR COMPUTATIONS

JOB NAME: Rock Creek Parkway

DPZ NO.:

DATE: 6/10/2004

Area #	Ex. I-26	Total Area	26769.00			
	l.f. pavement	= 7954 s.f.	= 29.71347 % @	0.86	=	0.255536
	building/roof	= s.f.	= 0 % @		=	0
	l.f. driveways	= s.f.	= 0 % @		=	0
	l.f. sidewalks	= s.f.	= 0 % @	0.86	=	0
		= s.f.	= 0 % @		=	0
Soil Type	C					
18815	s.f. lawn		= 70.28653 % @	0.16	=	0.112458
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f. bare soil		= 0 % @		=	0
	s.f. lawn		= 0 % @	0.19	=	0
			COMPOSITE "C"		=	0.367994
Area #	Ex. I-27	Total Area	55369.00			
	l.f. pavement	= 24766 s.f.	= 44.729 % @	0.86	=	0.384669
	building/roof	= s.f.	= 0 % @		=	0
	l.f. driveways	= s.f.	= 0 % @		=	0
	l.f. sidewalks	= s.f.	= 0 % @		=	0
		= s.f.	= 0 % @		=	0
Soil Type	C					
30603	s.f. lawn		= 55.271 % @	0.16	=	0.088434
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f. bare soil		= 0 % @		=	0
			= 0 % @		=	0
			COMPOSITE "C"		=	0.473103
Area #	Ex. I-28	Total Area	75981.00			
	l.f. pavement	= 33512 s.f.	= 44.10576 % @	0.86	=	0.37931
	building/roof	= s.f.	= 0 % @		=	0
	l.f. driveways	= s.f.	= 0 % @		=	0
	l.f. sidewalks	= s.f.	= 0 % @		=	0
		= s.f.	= 0 % @		=	0
Soil Type	C					
42469	s.f. lawn		= 55.89424 % @	0.16	=	0.089431
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f. bare soil		= 0 % @		=	0
			= 0 % @		=	0
			COMPOSITE "C"		=	0.46874

"C" FACTOR COMPUTATIONS

JOB NAME: Rock Creek Parkway

DPZ NO.:

DATE: 6/10/2004

Area #	Ex. I-29	Total Area	50758.00		
	l.f. pavement	= 25372 s.f.	= 49.98621 % @	0.86	= 0.429881
	building/roof	= s.f.	= 0 % @		= 0
	l.f. driveways	= s.f.	= 0 % @		= 0
	l.f. sidewalks	= s.f.	= 0 % @	0.86	= 0
		= s.f.	= 0 % @		= 0
Soil Type	C				
25386	s.f. lawn		= 50.01379 % @	0.16	= 0.080022
	s.f. woods		= 0 % @		= 0
	s.f. sparse veg.		= 0 % @		= 0
	s.f. bare soil		= 0 % @		= 0
	s.f. lawn		= 0 % @	0.19	= 0
			COMPOSITE "C"		= 0.509903
Area #	Ex. I-30	Total Area	6835.00		
	l.f. pavement	= 6835 s.f.	= 100 % @	0.86	= 0.86
	building/roof	= s.f.	= 0 % @		= 0
	l.f. driveways	= s.f.	= 0 % @		= 0
	l.f. sidewalks	= s.f.	= 0 % @		= 0
		= s.f.	= 0 % @		= 0
Soil Type	C				
	s.f. lawn		= 0 % @	0.16	= 0
	s.f. woods		= 0 % @		= 0
	s.f. sparse veg.		= 0 % @		= 0
	s.f. bare soil		= 0 % @		= 0
			= 0 % @		= 0
			COMPOSITE "C"		= 0.86
Area #	Ex. I-31	Total Area	10183.00		
	l.f. pavement	= 8759 s.f.	= 86.01591 % @	0.86	= 0.739737
	building/roof	= s.f.	= 0 % @		= 0
	l.f. driveways	= s.f.	= 0 % @		= 0
	l.f. sidewalks	= s.f.	= 0 % @		= 0
		= s.f.	= 0 % @		= 0
Soil Type	C				
1424	s.f. lawn		= 13.98409 % @	0.16	= 0.022375
	s.f. woods		= 0 % @		= 0
	s.f. sparse veg.		= 0 % @		= 0
	s.f. bare soil		= 0 % @		= 0
			= 0 % @		= 0
			COMPOSITE "C"		= 0.762111

"C" FACTOR COMPUTATIONS

JOB NAME: Rock Creek Parkway

DPZ NO.:

DATE: 6/10/2004

Area #	Ex. I-32	Total Area	6014.00			
	l.f. pavement	= 4600 s.f.	= 76.48819 % @	0.86	=	0.657798
	building/roof	= s.f.	= 0 % @		=	0
	l.f. driveways	= s.f.	= 0 % @		=	0
	l.f. sidewalks	= s.f.	= 0 % @	0.86	=	0
		= s.f.	= 0 % @		=	0
Soil Type	C					
1414	s.f. lawn		= 23.51181 % @	0.16	=	0.037619
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f. bare soil		= 0 % @		=	0
	s.f. lawn		= 0 % @	0.19	=	0
			COMPOSITE "C"		=	0.695417
Area #	Ex. I-33	Total Area	50410.00			
	l.f. pavement	= 21597 s.f.	= 42.84269 % @	0.86	=	0.368447
	building/roof	= s.f.	= 0 % @		=	0
	l.f. driveways	= s.f.	= 0 % @		=	0
	l.f. sidewalks	= s.f.	= 0 % @		=	0
		= s.f.	= 0 % @		=	0
Soil Type	C					
28813	s.f. lawn		= 57.15731 % @	0.16	=	0.091452
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f. bare soil		= 0 % @		=	0
			= 0 % @		=	0
			COMPOSITE "C"		=	0.459899
Area #	Ex. I-31	Total Area	15057.00			
	l.f. pavement	= 12635 s.f.	= 113.9212 % @	0.86	=	0.979722
	building/roof	= s.f.	= 0 % @		=	0
	l.f. driveways	= s.f.	= 0 % @		=	0
	l.f. sidewalks	= s.f.	= 0 % @		=	0
		= s.f.	= 0 % @		=	0
Soil Type	C					
2422	s.f. lawn		= 21.83753 % @	0.16	=	0.03494
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f. bare soil		= 0 % @		=	0
			= 0 % @		=	0
			COMPOSITE "C"		=	1.014662

"C" FACTOR COMPUTATIONS

JOB NAME: Rock Creek Parkway

DPZ NO.:

DATE: 6/10/2004

Area #	Ex. SC-1	Total Area	1361.00			
	l.f. pavement	= 1361 s.f.	= 100 % @	0.86	=	0.86
	building/roof	= s.f.	= 0 % @		=	0
	l.f. driveways	= s.f.	= 0 % @		=	0
	l.f. sidewalks	= s.f.	= 0 % @	0.86	=	0
		= s.f.	= 0 % @		=	0
Soil Type	C					
	s.f. lawn		= 0 % @	0.16	=	0
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f. bare soil		= 0 % @		=	0
	s.f. lawn		= 0 % @	0.19	=	0
			COMPOSITE "C"		=	0.86
Area #	Ex. SC-2	Total Area	1285.00			
	l.f. pavement	= 1285 s.f.	= 100 % @	0.86	=	0.86
	building/roof	= s.f.	= 0 % @		=	0
	l.f. driveways	= s.f.	= 0 % @		=	0
	l.f. sidewalks	= s.f.	= 0 % @		=	0
		= s.f.	= 0 % @		=	0
Soil Type	C					
	s.f. lawn		= 0 % @	0.16	=	0
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f. bare soil		= 0 % @		=	0
			= 0 % @		=	0
			COMPOSITE "C"		=	0.86
Area #	Ex. SC-3	Total Area	1151.00			
	l.f. pavement	= 1151 s.f.	= 100 % @	0.86	=	0.86
	building/roof	= s.f.	= 0 % @		=	0
	l.f. driveways	= s.f.	= 0 % @		=	0
	l.f. sidewalks	= s.f.	= 0 % @		=	0
		= s.f.	= 0 % @		=	0
Soil Type	C					
	s.f. lawn		= 0 % @	0.16	=	0
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f. bare soil		= 0 % @		=	0
			= 0 % @		=	0
			COMPOSITE "C"		=	0.86

"C" FACTOR COMPUTATIONS

JOB NAME: Rock Creek Parkway

DPZ NO.:

DATE: 6/10/2004

Area #	Ex. SC-4	Total Area	1089.00				
	l.f. pavement	=	1089 s.f.	=	100 % @	0.86	= 0.86
	building/roof	=	s.f.	=	0 % @		= 0
	l.f. driveways	=	s.f.	=	0 % @		= 0
	l.f. sidewalks	=	s.f.	=	0 % @	0.86	= 0
		=	s.f.	=	0 % @		= 0
Soil Type	C						
	s.f. lawn			=	0 % @	0.16	= 0
	s.f. woods			=	0 % @		= 0
	s.f. sparse veg.			=	0 % @		= 0
	s.f.bare soil			=	0 % @		= 0
	s.f. lawn			=	0 % @	0.19	= 0
					COMPOSITE "C"		= 0.86
Area #	Ex. SC-5	Total Area	1019.00				
	l.f. pavement	=	1019 s.f.	=	100 % @	0.86	= 0.86
	building/roof	=	s.f.	=	0 % @		= 0
	l.f. driveways	=	s.f.	=	0 % @		= 0
	l.f. sidewalks	=	s.f.	=	0 % @		= 0
		=	s.f.	=	0 % @		= 0
Soil Type	C						
	s.f. lawn			=	0 % @	0.16	= 0
	s.f. woods			=	0 % @		= 0
	s.f. sparse veg.			=	0 % @		= 0
	s.f.bare soil			=	0 % @		= 0
				=	0 % @		= 0
					COMPOSITE "C"		= 0.86
Area #	Ex. SC-6	Total Area	940.00				
	l.f. pavement	=	940 s.f.	=	100 % @	0.86	= 0.86
	building/roof	=	s.f.	=	0 % @		= 0
	l.f. driveways	=	s.f.	=	0 % @		= 0
	l.f. sidewalks	=	s.f.	=	0 % @		= 0
		=	s.f.	=	0 % @		= 0
Soil Type	C						
	s.f. lawn			=	0 % @	0.16	= 0
	s.f. woods			=	0 % @		= 0
	s.f. sparse veg.			=	0 % @		= 0
	s.f.bare soil			=	0 % @		= 0
				=	0 % @		= 0
					COMPOSITE "C"		= 0.86

"C" FACTOR COMPUTATIONS

JOB NAME: Rock Creek Parkway

DPZ NO.:

DATE: 6/10/2004

Area #	Ex. SC-7	Total Area	718.00			
	l.f. pavement	= 718 s.f.	= 100 % @	0.86	=	0.86
	building/roof	= s.f.	= 0 % @		=	0
	l.f. driveways	= s.f.	= 0 % @		=	0
	l.f. sidewalks	= s.f.	= 0 % @	0.86	=	0
		= s.f.	= 0 % @		=	0
Soil Type	C					
	s.f. lawn		= 0 % @	0.16	=	0
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f.bare soil		= 0 % @		=	0
	s.f. lawn		= 0 % @	0.19	=	0
			COMPOSITE "C"		=	0.86
Area #	Ex. SC-8	Total Area	1700.00			
	l.f. pavement	= 1700 s.f.	= 100 % @	0.86	=	0.86
	building/roof	= s.f.	= 0 % @		=	0
	l.f. driveways	= s.f.	= 0 % @		=	0
	l.f. sidewalks	= s.f.	= 0 % @		=	0
		= s.f.	= 0 % @		=	0
Soil Type	C					
	s.f. lawn		= 0 % @	0.16	=	0
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f.bare soil		= 0 % @		=	0
			= 0 % @		=	0
			COMPOSITE "C"		=	0.86
Area #	Ex. SC-9	Total Area	1504.00			
	l.f. pavement	= 1504 s.f.	= 100 % @	0.86	=	0.86
	building/roof	= s.f.	= 0 % @		=	0
	l.f. driveways	= s.f.	= 0 % @		=	0
	l.f. sidewalks	= s.f.	= 0 % @		=	0
		= s.f.	= 0 % @		=	0
Soil Type	C					
	s.f. lawn		= 0 % @	0.16	=	0
	s.f. woods		= 0 % @		=	0
	s.f. sparse veg.		= 0 % @		=	0
	s.f.bare soil		= 0 % @		=	0
			= 0 % @		=	0
			COMPOSITE "C"		=	0.86

"C" FACTOR COMPUTATIONS

JOB NAME: Rock Creek Parkway

DPZ NO.:

DATE: 6/10/2004

Area #	I-3	Total Area	16309.88				
	l.f. pavement	= 3537 s.f.	= 21.68624 % @	0.86	=	0.186502	
	building/roof	= s.f.	= 0 % @		=	0	
	l.f. driveways	= s.f.	= 0 % @		=	0	
	l.f. sidewalks	= s.f.	= 0 % @	0.86	=	0	
		= s.f.	= 0 % @		=	0	
Soil Type	C						
12772.88	s.f. lawn		= 78.31376 % @	0.16	=	0.125302	
	s.f. woods		= 0 % @		=	0	
	s.f. sparse veg.		= 0 % @		=	0	
	s.f. bare soil		= 0 % @		=	0	
	s.f. lawn		= 0 % @	0.19	=	0	
			COMPOSITE "C"		=	0.311804	
Area #	I-4	Total Area	36449.00				
	l.f. pavement	= 13897 s.f.	= 38.12725 % @	0.86	=	0.327894	
	building/roof	= s.f.	= 0 % @		=	0	
	l.f. driveways	= s.f.	= 0 % @		=	0	
	l.f. sidewalks	= s.f.	= 0 % @		=	0	
		= s.f.	= 0 % @		=	0	
Soil Type	C						
22552	s.f. lawn		= 61.87275 % @	0.16	=	0.098996	
	s.f. woods		= 0 % @		=	0	
	s.f. sparse veg.		= 0 % @		=	0	
	s.f. bare soil		= 0 % @		=	0	
			= 0 % @		=	0	
			COMPOSITE "C"		=	0.426891	
Area #	I-5	Total Area	7261.00				
	l.f. pavement	= 3869 s.f.	= 53.28467 % @	0.86	=	0.458248	
	building/roof	= s.f.	= 0 % @		=	0	
	l.f. driveways	= s.f.	= 0 % @		=	0	
	l.f. sidewalks	= s.f.	= 0 % @		=	0	
		= s.f.	= 0 % @		=	0	
Soil Type	C						
3392	s.f. lawn		= 46.71533 % @	0.16	=	0.074745	
	s.f. woods		= 0 % @		=	0	
	s.f. sparse veg.		= 0 % @		=	0	
	s.f. bare soil		= 0 % @		=	0	
			= 0 % @		=	0	
			COMPOSITE "C"		=	0.532993	

"C" FACTOR COMPUTATIONS

JOB NAME: Rock Creek Parkway

DPZ NO.:

DATE: 6/10/2004

Area #	<u>I-6</u>	Total Area	<u>20765.51</u>			
	l.f. pavement	= <u>6170</u> s.f.	= <u>29.71273</u> % @	<u>0.86</u>	=	<u>0.255529</u>
	building/roof	= _____ s.f.	= <u>0</u> % @	_____	=	<u>0</u>
	l.f. driveways	= _____ s.f.	= <u>0</u> % @	_____	=	<u>0</u>
	l.f. sidewalks	= _____ s.f.	= <u>0</u> % @	<u>0.86</u>	=	<u>0</u>
		= _____ s.f.	= <u>0</u> % @	_____	=	<u>0</u>
Soil Type	<u>C</u>					
<u>14595.51</u>	s.f. lawn		= <u>70.28727</u> % @	<u>0.16</u>	=	<u>0.11246</u>
	s.f. woods		= <u>0</u> % @	_____	=	<u>0</u>
	s.f. sparse veg.		= <u>0</u> % @	_____	=	<u>0</u>
	s.f.bare soil		= <u>0</u> % @	_____	=	<u>0</u>
	s.f. lawn		= <u>0</u> % @	<u>0.19</u>	=	<u>0</u>
			COMPOSITE "C"		=	<u>0.367989</u>
Area #	_____	Total Area	<u>0.00</u>			
	l.f. pavement	= _____ s.f.	= <u>0</u> % @	<u>0.86</u>	=	<u>0</u>
	building/roof	= _____ s.f.	= <u>0</u> % @	_____	=	<u>0</u>
	l.f. driveways	= _____ s.f.	= <u>0</u> % @	_____	=	<u>0</u>
	l.f. sidewalks	= _____ s.f.	= <u>0</u> % @	_____	=	<u>0</u>
		= _____ s.f.	= <u>0</u> % @	_____	=	<u>0</u>
Soil Type	<u>C</u>					
	s.f. lawn		= <u>0</u> % @	<u>0.16</u>	=	<u>0</u>
	s.f. woods		= <u>0</u> % @	_____	=	<u>0</u>
	s.f. sparse veg.		= <u>0</u> % @	_____	=	<u>0</u>
	s.f.bare soil		= <u>0</u> % @	_____	=	<u>0</u>
			= <u>0</u> % @	_____	=	<u>0</u>
			COMPOSITE "C"		=	<u>0</u>
Area #	_____	Total Area	<u>0.00</u>			
	l.f. pavement	= _____ s.f.	= <u>0</u> % @	<u>0.86</u>	=	<u>0</u>
	building/roof	= _____ s.f.	= <u>0</u> % @	_____	=	<u>0</u>
	l.f. driveways	= _____ s.f.	= <u>0</u> % @	_____	=	<u>0</u>
	l.f. sidewalks	= _____ s.f.	= <u>0</u> % @	_____	=	<u>0</u>
		= _____ s.f.	= <u>0</u> % @	_____	=	<u>0</u>
Soil Type	<u>C</u>					
	s.f. lawn		= <u>0</u> % @	<u>0.16</u>	=	<u>0</u>
	s.f. woods		= <u>0</u> % @	_____	=	<u>0</u>
	s.f. sparse veg.		= <u>0</u> % @	_____	=	<u>0</u>
	s.f.bare soil		= <u>0</u> % @	_____	=	<u>0</u>
			= <u>0</u> % @	_____	=	<u>0</u>
			COMPOSITE "C"		=	<u>0</u>

APPENDIX “E”

FHWA HY-22 Drainage of Highway Pavements (Spread & Efficiency)

I-1

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/09/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0800
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.650
T	Width of Spread (ft)	5.53

Gutter Flow

Eo	Gutter Flow Ratio	0.524
d	Depth of Flow (ft)	0.17
V	Average Velocity (ft/sec)	1.93

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	9.27	3.12	0.02	0.015	0.635
Curved Vane	1.83	3.00	0.88	0.558	0.077
Combination			0.88	0.573	0.077

Note: The curb opening length in the input screen is the total
length
of the curb opening including its length along the grate.

I-2

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/09/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0800
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.870
T	Width of Spread (ft)	6.28

Gutter Flow

Eo	Gutter Flow Ratio	0.467
d	Depth of Flow (ft)	0.19
V	Average Velocity (ft/sec)	2.05

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	10.92	3.12	0.02	0.017	0.853
Curved Vane	1.83	3.00	0.84	0.713	0.140
Combination			0.84	0.730	0.140

Note: The curb opening length in the input screen is the total
length of the curb opening including its length along the grate.

I-3

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/09/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0800
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.780
T	Width of Spread (ft)	5.99

Gutter Flow

Eo	Gutter Flow Ratio	0.488
d	Depth of Flow (ft)	0.18
V	Average Velocity (ft/sec)	2.01

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	10.27	6.25	0.04	0.034	0.746
Curved Vane	1.83	6.00	0.94	0.699	0.047
Combination			0.94	0.733	0.047

Note: The curb opening length in the input screen is the total
length
of the curb opening including its length along the grate.

I-4

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/10/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0250
Sx	Pavement Cross Slope (ft/ft)	0.0350
Sw	Gutter Cross Slope (ft/ft)	0.0800
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	2.020
T	Width of Spread (ft)	5.24

Gutter Flow

Eo	Gutter Flow Ratio	0.486
d	Depth of Flow (ft)	0.23
V	Average Velocity (ft/sec)	4.02

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	18.50	6.25	0.02	0.049	1.971
Curved Vane	1.83	6.00	0.89	1.764	0.207
Combination			0.90	1.813	0.207

Note: The curb opening length in the input screen is the total
length
of the curb opening including its length along the grate.

I-5

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/10/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0800
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.570
T	Width of Spread (ft)	5.22

Gutter Flow

Eo	Gutter Flow Ratio	0.551
d	Depth of Flow (ft)	0.16
V	Average Velocity (ft/sec)	1.88

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	8.61	3.25	0.05	0.029	0.541
Curved Vane	1.83	3.00	0.90	0.487	0.054
Combination			0.91	0.516	0.054

Note: The curb opening length in the input screen is the total
length
of the curb opening including its length along the grate.

I-6

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/10/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0250
Sw	Gutter Cross Slope (ft/ft)	0.0800
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	1.230
T	Width of Spread (ft)	6.32

Gutter Flow

Eo	Gutter Flow Ratio	0.439
d	Depth of Flow (ft)	0.21
V	Average Velocity (ft/sec)	2.33

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	12.45	6.25	0.04	0.044	1.186
Curved Vane	1.83	6.00	0.92	1.087	0.099
Combination			0.92	1.131	0.099

Note: The curb opening length in the input screen is the total
length
of the curb opening including its length along the grate.

I-7

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/10/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0800
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.950
T	Width of Spread (ft)	6.51

Gutter Flow

Eo	Gutter Flow Ratio	0.451
d	Depth of Flow (ft)	0.19
V	Average Velocity (ft/sec)	2.09

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	11.47	6.25	0.04	0.037	0.913
Curved Vane	1.83	6.00	0.92	0.841	0.072
Combination			0.92	0.878	0.072

Note: The curb opening length in the input screen is the total
length
of the curb opening including its length along the grate.

I-8

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/10/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	Composite/Dep
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0600
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	3.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	10.71
L	Curb-Opening Length (ft)	4.33
H	Curb-Opening Height (in)	5.00
d_curb	Depth at Curb (ft)	0.504
Qi	Intercepted Flow (cfs)	1.400

I-9

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/10/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	Composite/Dep
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0600
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	3.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	10.87
L	Curb-Opening Length (ft)	4.33
H	Curb-Opening Height (in)	5.00
d_curb	Depth at Curb (ft)	0.507
Qi	Intercepted Flow (cfs)	1.430

Ex. I-1

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/10/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
Sx	Pavement Cross Slope (ft/ft)	0.0300
Sw	Gutter Cross Slope (ft/ft)	0.0400
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00

Inlet Interception

	Inlet Type *Sag*	Parallel Bar P-1-1/8
T	Width of Spread (ft)	3.80
WGR	Grate Width (ft)	1.83
L	Grate Length (ft)	3.00
d_ave	Depth of Flow (ft)	0.104
d_curb	Depth at Curb (ft)	0.124
Qi	Intercepted Flow (cfs)	0.670

Ex.I-2

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/10/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0450
Sx	Pavement Cross Slope (ft/ft)	0.0300
Sw	Gutter Cross Slope (ft/ft)	0.0300
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.450
T	Width of Spread (ft)	3.06

Gutter Flow

Eo	Gutter Flow Ratio	0.652
d	Depth of Flow (ft)	0.09
V	Average Velocity (ft/sec)	3.21

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	17.24	3.12	0.01	0.006	0.444
Parallel Bar P-1-1/8	1.83	3.00	0.93	0.415	0.029
Combination			0.94	0.421	0.029

Note: The curb opening length in the input screen is the total
length of the curb opening including its length along the grate.

Ex.I-3

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/10/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.340
T	Width of Spread (ft)	4.70

Gutter Flow

Eo	Gutter Flow Ratio	0.472
d	Depth of Flow (ft)	0.09
V	Average Velocity (ft/sec)	1.54

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	12.45	3.12	0.02	0.006	0.334
Parallel Bar P-1-1/8	1.83	3.00	0.85	0.284	0.050
Combination			0.85	0.290	0.050

Note: The curb opening length in the input screen is the total
length of the curb opening including its length along the grate.

Ex.I-4

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/10/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0400
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.810
T	Width of Spread (ft)	6.37

Gutter Flow

Eo	Gutter Flow Ratio	0.399
d	Depth of Flow (ft)	0.15
V	Average Velocity (ft/sec)	1.95

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	14.66	3.12	0.01	0.012	0.798
Parallel Bar P-1-1/8	1.83	3.00	0.77	0.618	0.180
Combination			0.78	0.630	0.180

Note: The curb opening length in the input screen is the total length of the curb opening including its length along the grate.

Ex.I-7

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/10/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Equal-Length Combination Inlet

Roadway and Discharge Data

	Cross Slope	Composite/Dep
Sx	Pavement Cross Slope (ft/ft)	0.0100
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.50

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
L	Curb-Opening Length (ft)	3.00
H	Curb-Opening Height (in)	6.00
	Inlet Type *Sag*	Parallel Bar P-1-1/8
T	Width of Spread (ft)	3.86
WGR	Grate Width (ft)	1.83
L	Grate Length (ft)	3.00
	Inlet Type *Sag*	Equal Length Combination
d_ave	Depth of Flow (ft)	0.059
d_curb	Depth at Curb (ft)	0.090
Qi	Intercepted Flow (cfs)	0.290

Ex.I-8

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/10/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0400
Sw	Gutter Cross Slope (ft/ft)	0.0400
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	0.00
a	Gutter Depression (inch)	2.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	5.84
L	Curb-Opening Length (ft)	5.00
H	Curb-Opening Height (in)	3.00
d_curb	Depth at Curb (ft)	0.234
Qi	Intercepted Flow (cfs)	1.300

Ex.I-9

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/10/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	Composite/Dep
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0400
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	3.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	2.82
L	Curb-Opening Length (ft)	5.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.326
Qi	Intercepted Flow (cfs)	0.210

Ex.I-10

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/10/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0500
Sw	Gutter Cross Slope (ft/ft)	0.0500
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	0.00
a	Gutter Depression (inch)	2.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	3.38
L	Curb-Opening Length (ft)	5.00
H	Curb-Opening Height (in)	3.00
d_curb	Depth at Curb (ft)	0.169
Qi	Intercepted Flow (cfs)	0.800

Ex.I-11

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/10/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0400
Sw	Gutter Cross Slope (ft/ft)	0.0400
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	0.00
a	Gutter Depression (inch)	2.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	5.75
L	Curb-Opening Length (ft)	5.00
H	Curb-Opening Height (in)	3.00
d_curb	Depth at Curb (ft)	0.230
Qi	Intercepted Flow (cfs)	1.270

Ex.I-12

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/10/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0500
Sw	Gutter Cross Slope (ft/ft)	0.0500
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	0.00
a	Gutter Depression (inch)	2.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	2.85
L	Curb-Opening Length (ft)	5.00
H	Curb-Opening Height (in)	3.00
d_curb	Depth at Curb (ft)	0.143
Qi	Intercepted Flow (cfs)	0.620

Ex.I-13

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/10/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0400
Sw	Gutter Cross Slope (ft/ft)	0.0400
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	0.00
a	Gutter Depression (inch)	2.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	3.68
L	Curb-Opening Length (ft)	5.00
H	Curb-Opening Height (in)	3.00
d_curb	Depth at Curb (ft)	0.147
Qi	Intercepted Flow (cfs)	0.650

Ex.I-14

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/10/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0400
Sw	Gutter Cross Slope (ft/ft)	0.0400
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.50
a	Gutter Depression (inch)	3.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	1.38
L	Curb-Opening Length (ft)	5.00
H	Curb-Opening Height (in)	3.00
d_curb	Depth at Curb (ft)	0.305
Qi	Intercepted Flow (cfs)	0.230

Ex.I-15

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0400
Sw	Gutter Cross Slope (ft/ft)	0.0400
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.50
a	Gutter Depression (inch)	3.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	4.88
L	Curb-Opening Length (ft)	5.00
H	Curb-Opening Height (in)	3.00
d_curb	Depth at Curb (ft)	0.445
Qi	Intercepted Flow (cfs)	1.530

Ex.I-16

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Equal-Length Combination Inlet

Roadway and Discharge Data

	Cross Slope	Composite
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0400
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
L	Curb-Opening Length (ft)	6.00
H	Curb-Opening Height (in)	3.00
	Inlet Type *Sag*	Parallel Bar P-1-1/8
T	Width of Spread (ft)	4.52
WGR	Grate Width (ft)	1.83
L	Grate Length (ft)	6.00
	Inlet Type *Sag*	Equal Length Combination
d_ave	Depth of Flow (ft)	0.090
d_curb	Depth at Curb (ft)	0.110
Qi	Intercepted Flow (cfs)	0.790

Ex.I-17

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Equal-Length Combination Inlet

Roadway and Discharge Data

	Cross Slope	Composite
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0400
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
L	Curb-Opening Length (ft)	6.00
H	Curb-Opening Height (in)	3.00
	Inlet Type *Sag*	Parallel Bar P-1-1/8
T	Width of Spread (ft)	4.86
WGR	Grate Width (ft)	1.83
L	Grate Length (ft)	6.00
	Inlet Type *Sag*	Equal Length Combination
d_ave	Depth of Flow (ft)	0.097
d_curb	Depth at Curb (ft)	0.117
Qi	Intercepted Flow (cfs)	0.880

Ex.I-19

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Equal-Length Combination Inlet

Roadway and Discharge Data

	Cross Slope	Composite
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0800
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
L	Curb-Opening Length (ft)	6.00
H	Curb-Opening Height (in)	3.00
	Inlet Type *Sag*	Curved Vane
T	Width of Spread (ft)	6.03
WGR	Grate Width (ft)	1.83
L	Grate Length (ft)	6.00
	Inlet Type *Sag*	Equal Length Combination
d_ave	Depth of Flow (ft)	0.141
d_curb	Depth at Curb (ft)	0.181
Qi	Intercepted Flow (cfs)	1.530

Ex.I-20

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Equal-Length Combination Inlet

Roadway and Discharge Data

	Cross Slope	Composite
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0800
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
L	Curb-Opening Length (ft)	6.00
H	Curb-Opening Height (in)	3.00
	Inlet Type *Sag*	Curved Vane
T	Width of Spread (ft)	6.39
WGR	Grate Width (ft)	1.83
L	Grate Length (ft)	6.00
	Inlet Type *Sag*	Equal Length Combination
d_ave	Depth of Flow (ft)	0.148
d_curb	Depth at Curb (ft)	0.188
Qi	Intercepted Flow (cfs)	1.650

Ex.I-21

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0800
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.690
T	Width of Spread (ft)	5.68

Gutter Flow

Eo	Gutter Flow Ratio	0.512
d	Depth of Flow (ft)	0.17
V	Average Velocity (ft/sec)	1.96

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	9.59	3.25	0.05	0.032	0.658
Curved Vane	1.83	3.00	0.87	0.575	0.083
Combination			0.88	0.607	0.083

Note: The curb opening length in the input screen is the total length of the curb opening including its length along the grate.

Ex.I-22

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0800
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	1.240
T	Width of Spread (ft)	7.28

Gutter Flow

Eo	Gutter Flow Ratio	0.405
d	Depth of Flow (ft)	0.21
V	Average Velocity (ft/sec)	2.22

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	13.30
L	Curb-Opening Length (ft)	3.25
e	Inlet Efficiency	0.396
Qi	Intercepted Flow (cfs)	0.491
Qb	By-pass Flow (cfs)	0.749

Ex.I-23

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0800
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.730
T	Width of Spread (ft)	5.82

Gutter Flow

Eo	Gutter Flow Ratio	0.500
d	Depth of Flow (ft)	0.18
V	Average Velocity (ft/sec)	1.98

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	9.90	3.25	0.05	0.033	0.697
Curved Vane	1.83	3.00	0.87	0.604	0.094
Combination			0.87	0.636	0.094

Note: The curb opening length in the input screen is the total length of the curb opening including its length along the grate.

Ex.I-24

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0800
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.820
T	Width of Spread (ft)	6.12

Gutter Flow

Eo	Gutter Flow Ratio	0.478
d	Depth of Flow (ft)	0.18
V	Average Velocity (ft/sec)	2.03

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	10.57	3.25	0.04	0.035	0.785
Curved Vane	1.83	3.00	0.85	0.666	0.119
Combination			0.85	0.701	0.119

Note: The curb opening length in the input screen is the total
length of the curb opening including its length along the grate.

Ex.I-25

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0070
Sx	Pavement Cross Slope (ft/ft)	0.0300
Sw	Gutter Cross Slope (ft/ft)	0.0800
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	1.430
T	Width of Spread (ft)	6.46

Gutter Flow

Eo	Gutter Flow Ratio	0.414
d	Depth of Flow (ft)	0.24
V	Average Velocity (ft/sec)	2.19

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	11.70	6.25	0.04	0.055	1.375
Curved Vane	1.83	6.00	0.92	1.271	0.104
Combination			0.93	1.326	0.104

Note: The curb opening length in the input screen is the total length of the curb opening including its length along the grate.

Ex. I-26

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Equal-Length Combination Inlet

Roadway and Discharge Data

	Cross Slope	Composite
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0800
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
L	Curb-Opening Length (ft)	6.00
H	Curb-Opening Height (in)	3.00
	Inlet Type *Sag*	Curved Vane
T	Width of Spread (ft)	6.48
WGR	Grate Width (ft)	1.83
L	Grate Length (ft)	6.00
	Inlet Type *Sag*	Equal Length Combination
d_ave	Depth of Flow (ft)	0.150
d_curb	Depth at Curb (ft)	0.190
Qi	Intercepted Flow (cfs)	1.680

Ex.I-27

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Equal-Length Combination Inlet

Roadway and Discharge Data

	Cross Slope	Composite
Sx	Pavement Cross Slope (ft/ft)	0.0600
Sw	Gutter Cross Slope (ft/ft)	0.0800
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
L	Curb-Opening Length (ft)	6.00
H	Curb-Opening Height (in)	3.00
	Inlet Type *Sag*	Curved Vane
T	Width of Spread (ft)	5.03
WGR	Grate Width (ft)	1.83
L	Grate Length (ft)	6.00
	Inlet Type *Sag*	Equal Length Combination
d_ave	Depth of Flow (ft)	0.282
d_curb	Depth at Curb (ft)	0.322
Qi	Intercepted Flow (cfs)	4.340

Ex.I-28

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0600
Sw	Gutter Cross Slope (ft/ft)	0.0800
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	4.730
T	Width of Spread (ft)	6.30

Gutter Flow

Eo	Gutter Flow Ratio	0.381
d	Depth of Flow (ft)	0.40
V	Average Velocity (ft/sec)	3.94

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	18.11	6.25	0.02	0.117	4.613
Curved Vane	1.83	6.00	0.88	4.059	0.554
Combination			0.88	4.176	0.554

Note: The curb opening length in the input screen is the total length of the curb opening including its length along the grate.

Ex.I-29

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Equal-Length Combination Inlet

Roadway and Discharge Data

	Cross Slope	Composite
Sx	Pavement Cross Slope (ft/ft)	0.0300
Sw	Gutter Cross Slope (ft/ft)	0.0800
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
L	Curb-Opening Length (ft)	6.00
H	Curb-Opening Height (in)	3.00
	Inlet Type *Sag*	Curved Vane
T	Width of Spread (ft)	7.37
WGR	Grate Width (ft)	1.83
L	Grate Length (ft)	6.00
	Inlet Type *Sag*	Equal Length Combination
d_ave	Depth of Flow (ft)	0.231
d_curb	Depth at Curb (ft)	0.271
Qi	Intercepted Flow (cfs)	3.220

Ex.I-30

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.1000
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0800
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.940
T	Width of Spread (ft)	3.85

Gutter Flow

Eo	Gutter Flow Ratio	0.701
d	Depth of Flow (ft)	0.14
V	Average Velocity (ft/sec)	5.28

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	19.30	6.25	0.02	0.022	0.918
Curved Vane	1.83	6.00	0.96	0.879	0.040
Combination			0.96	0.900	0.040

Note: The curb opening length in the input screen is the total length of the curb opening including its length along the grate.

Ex.I-31

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Equal-Length Combination Inlet

Roadway and Discharge Data

	Cross Slope	Composite
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0400
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
L	Curb-Opening Length (ft)	6.00
H	Curb-Opening Height (in)	3.00
	Inlet Type *Sag*	Parallel Bar P-1-1/8
T	Width of Spread (ft)	6.14
WGR	Grate Width (ft)	1.83
L	Grate Length (ft)	6.00
	Inlet Type *Sag*	Equal Length Combination
d_ave	Depth of Flow (ft)	0.123
d_curb	Depth at Curb (ft)	0.143

Ex.I-32

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Equal-Length Combination Inlet

Roadway and Discharge Data

	Cross Slope	Composite
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0400
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
L	Curb-Opening Length (ft)	6.00
H	Curb-Opening Height (in)	3.00
	Inlet Type *Sag*	Parallel Bar P-1-1/8
T	Width of Spread (ft)	4.05
WGR	Grate Width (ft)	1.83
L	Grate Length (ft)	6.00
	Inlet Type *Sag*	Equal Length Combination
d_ave	Depth of Flow (ft)	0.081
d_curb	Depth at Curb (ft)	0.101
Qi	Intercepted Flow (cfs)	0.670

Ex.I-33

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Sag: Equal-Length Combination Inlet

Roadway and Discharge Data

	Cross Slope	Composite
Sx	Pavement Cross Slope (ft/ft)	0.0300
Sw	Gutter Cross Slope (ft/ft)	0.0800
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	1.00
a	Gutter Depression (inch)	0.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
L	Curb-Opening Length (ft)	6.00
H	Curb-Opening Height (in)	3.00
	Inlet Type *Sag*	Curved Vane
T	Width of Spread (ft)	7.30
WGR	Grate Width (ft)	1.83
L	Grate Length (ft)	6.00
	Inlet Type *Sag*	Equal Length Combination
d_ave	Depth of Flow (ft)	0.229
d_curb	Depth at Curb (ft)	0.269
Qi	Intercepted Flow (cfs)	3.180

Ex.SC-1

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0300
Sw	Gutter Cross Slope (ft/ft)	0.0300
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	0.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.190
T	Width of Spread (ft)	2.93

Gutter Flow

Eo	Gutter Flow Ratio	0.000
d	Depth of Flow (ft)	0.09
V	Average Velocity (ft/sec)	1.48

Inlet Interception

	Inlet Type	Parallel Bar P-1-1/8
L	Grate Length (ft)	1.20
WGR	Grate Width (ft)	0.80
e	Inlet Efficiency	0.629
Qi	Intercepted Flow (cfs)	0.119
Qb	By-pass Flow (cfs)	0.071

Ex.SC-2

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0300
Sw	Gutter Cross Slope (ft/ft)	0.0300
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	0.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.250
T	Width of Spread (ft)	3.25

Gutter Flow

Eo	Gutter Flow Ratio	0.000
d	Depth of Flow (ft)	0.10
V	Average Velocity (ft/sec)	1.58

Inlet Interception

	Inlet Type	Parallel Bar P-1-1/8
L	Grate Length (ft)	1.20
WGR	Grate Width (ft)	0.80
e	Inlet Efficiency	0.585
Qi	Intercepted Flow (cfs)	0.146
Qb	By-pass Flow (cfs)	0.104

Ex.SC-3

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0300
Sw	Gutter Cross Slope (ft/ft)	0.0300
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	0.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.250
T	Width of Spread (ft)	3.25

Gutter Flow

Eo	Gutter Flow Ratio	0.000
d	Depth of Flow (ft)	0.10
V	Average Velocity (ft/sec)	1.58

Inlet Interception

	Inlet Type	Parallel Bar P-1-1/8
L	Grate Length (ft)	1.20
WGR	Grate Width (ft)	0.80
e	Inlet Efficiency	0.585
Qi	Intercepted Flow (cfs)	0.146
Qb	By-pass Flow (cfs)	0.104

Ex.SC-4

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0300
Sw	Gutter Cross Slope (ft/ft)	0.0300
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	0.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.260
T	Width of Spread (ft)	3.30

Gutter Flow

Eo	Gutter Flow Ratio	0.000
d	Depth of Flow (ft)	0.10
V	Average Velocity (ft/sec)	1.60

Inlet Interception

	Inlet Type	Parallel Bar P-1-1/8
L	Grate Length (ft)	1.20
WGR	Grate Width (ft)	0.80
e	Inlet Efficiency	0.579
Qi	Intercepted Flow (cfs)	0.151
Qb	By-pass Flow (cfs)	0.109

Ex.SC-5

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0300
Sw	Gutter Cross Slope (ft/ft)	0.0300
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	0.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.250
T	Width of Spread (ft)	3.25

Gutter Flow

Eo	Gutter Flow Ratio	0.000
d	Depth of Flow (ft)	0.10
V	Average Velocity (ft/sec)	1.58

Inlet Interception

	Inlet Type	Parallel Bar P-1-1/8
L	Grate Length (ft)	1.20
WGR	Grate Width (ft)	0.80
e	Inlet Efficiency	0.585
Qi	Intercepted Flow (cfs)	0.146
Qb	By-pass Flow (cfs)	0.104

Ex.SC-6

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0300
Sw	Gutter Cross Slope (ft/ft)	0.0300
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	0.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.220
T	Width of Spread (ft)	3.10

Gutter Flow

Eo	Gutter Flow Ratio	0.000
d	Depth of Flow (ft)	0.09
V	Average Velocity (ft/sec)	1.53

Inlet Interception

	Inlet Type	Parallel Bar P-1-1/8
L	Grate Length (ft)	1.20
WGR	Grate Width (ft)	0.80
e	Inlet Efficiency	0.605
Qi	Intercepted Flow (cfs)	0.133
Qb	By-pass Flow (cfs)	0.087

Ex.SC-7

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0300
Sw	Gutter Cross Slope (ft/ft)	0.0300
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	0.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.190
T	Width of Spread (ft)	2.93

Gutter Flow

Eo	Gutter Flow Ratio	0.000
d	Depth of Flow (ft)	0.09
V	Average Velocity (ft/sec)	1.48

Inlet Interception

	Inlet Type	Parallel Bar P-1-1/8
L	Grate Length (ft)	1.20
WGR	Grate Width (ft)	0.80
e	Inlet Efficiency	0.629
Qi	Intercepted Flow (cfs)	0.119
Qb	By-pass Flow (cfs)	0.071

Ex.SC-8

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0300
Sw	Gutter Cross Slope (ft/ft)	0.0300
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	0.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.310
T	Width of Spread (ft)	3.52

Gutter Flow

Eo	Gutter Flow Ratio	0.000
d	Depth of Flow (ft)	0.11
V	Average Velocity (ft/sec)	1.67

Inlet Interception

	Inlet Type	Parallel Bar P-1-1/8
L	Grate Length (ft)	1.20
WGR	Grate Width (ft)	0.80
e	Inlet Efficiency	0.552
Qi	Intercepted Flow (cfs)	0.171
Qb	By-pass Flow (cfs)	0.139

Ex.SC-9

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/11/2006

Project No. :99-018
Project Name.:Rock Creek Parkway
Computed by :DRB

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0300
Sw	Gutter Cross Slope (ft/ft)	0.0300
n	Manning's Coefficient	0.015
W	Gutter Width (ft)	0.00
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	0.350
T	Width of Spread (ft)	3.68

Gutter Flow

Eo	Gutter Flow Ratio	0.000
d	Depth of Flow (ft)	0.11
V	Average Velocity (ft/sec)	1.72

Inlet Interception

	Inlet Type	Parallel Bar P-1-1/8
L	Grate Length (ft)	1.20
WGR	Grate Width (ft)	0.80
e	Inlet Efficiency	0.533
Qi	Intercepted Flow (cfs)	0.187
Qb	By-pass Flow (cfs)	0.163

APPENDIX “F”

Storm Sewer Design Computations

STORM SEWER DESIGN COMPUTATIONS

Project Name: Rock Creek Parkway
 Computed By: DRB
 Checked By: _____
 Date: _____

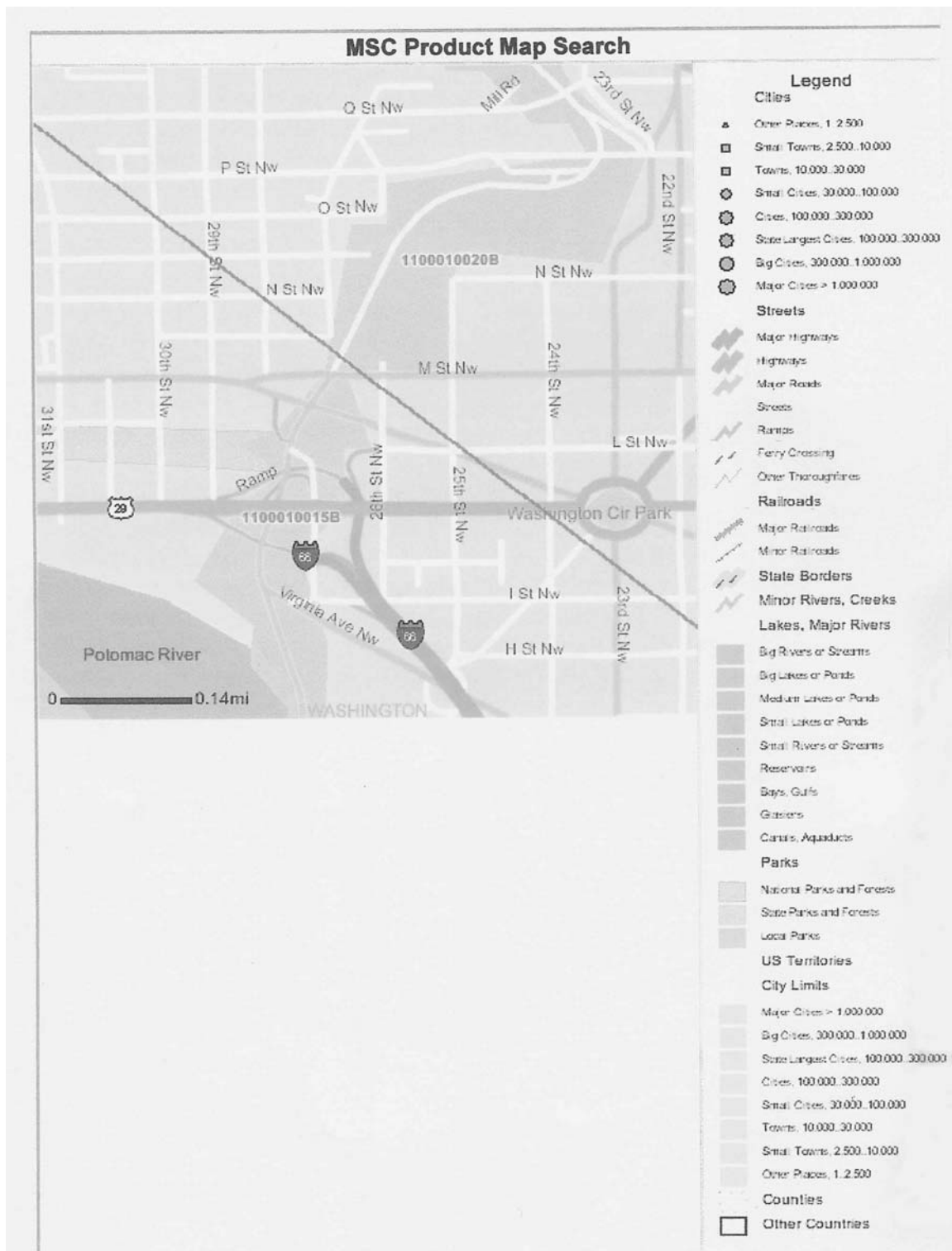
Sheet: 1 of 1

Design Frequency: 25 yr.

[illegible]

APPENDIX “G”

FEMA DATA



FLOODING SOURCE	PANEL ¹	ELEVATION DIFFERENCE ² BETWEEN 1.0% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION ³ (NGVD)
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
POTOMAC RIVER REACH 1 REACH 2 REACH 3 ANACOSTIA RIVER	0025,0015 0005,0015 0005	-5.8 -9.2 -12.3	-2.0 -2.9 -3.8	4.3 6.5 9.9	080 090 120	A12 A18 A22	VARIES-SEE MAP VARIES-SEE MAP VARIES-SEE MAP
REACH 1 ROCK CREEK REACH 1	0025,0030 0010,0015, 0020	-4.9 -5.1	-1.7 -1.3	3.4 N/A ⁴	050 050	A10 A10	VARIES-SEE MAP VARIES-SEE MAP
CREEK ALONG NORMANSTONE DRIVE REACH 1 EAST CREEK A REACH 1 EAST CREEK B REACH 1	0020 0005 0005	-2.1 -1.8 -2.1	-0.5 -0.5 -0.9	1.1 1.2 1.9	020 020 020	A4 A4 A4	VARIES-SEE MAP VARIES-SEE MAP VARIES-SEE MAP

¹FLOOD INSURANCE RATE MAP PANEL

²WEIGHTED AVERAGE

³ROUNDED TO NEAREST FOOT

⁴EXISTING DATA STUDY, NO 500-YEAR FLOOD DETERMINATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

DISTRICT OF COLUMBIA
WASHINGTON D.C.

FLOOD INSURANCE ZONE DATA

POTOMAC RIVER -- ANACOSTIA RIVER -- ROCK CREEK --
CREEK ALONG NORMANSTONE DRIVE -- EAST CREEK A -- EAST CREEK B

TABLE 4

